ELECTRICAL REVIEW

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13th February, 1948

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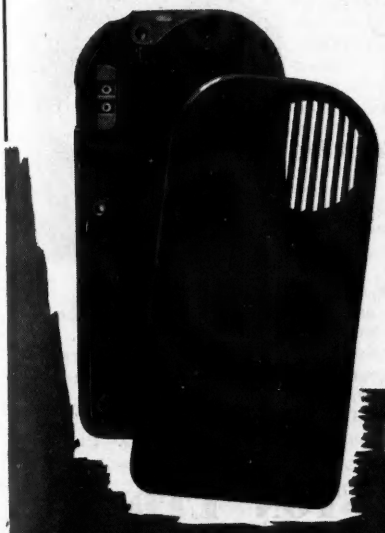

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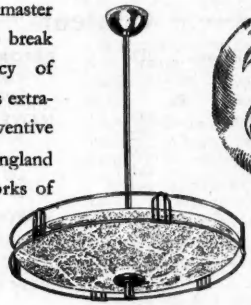

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ELECTRICAL REVIEW

THE OLDEST ELECTRICAL PAPER — ESTABLISHED 1872

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Electricity Change-over

Minister Announces Vesting Date

AS was generally anticipated, the date for the vesting of all the country's authorized electricity supply undertakings in the British Electricity Authority and Area Electricity Boards is 1st April. The long-delayed announcement was made by the Minister of Fuel and Power (Mr. H. Gaitskell) last Friday.

Although much clearing of the ground has been accomplished by the Authority since its appointment last August, it cannot be anticipated that in the period of less than two months which remains the position will be such that the taking-over will be done in one clear-cut move. The process must extend over probably a year or two with the present administrations carrying on under the new ownership.

In the last six months it has been possible to set up the main structure of the British Electricity Authority and most of the chief officers, deputy chief officers and other senior officials have already been appointed; many of them are still running in double harness and much credit is due to them for the way in which they have given the complicated mechanism a start.

Nature of the Organization

We find that much confusion exists generally in the minds of those who have not closely followed events as to the relationships of the Authority, the generation divisions, and the Area Boards and other aspects of the new organization. To remedy this we publish in this issue a "family tree" diagram of the Authority and headquarters staff with an outline of the arrangements so far made. Space limitations preclude more than a general survey at present. Later we will be able to deal with the many different aspects of the work of the organization in greater detail.

Under the Electricity Act the B.E.A. "may give such directions to Area Boards as may appear to the Central Authority to be necessary or expedient for the purpose of co-ordinating the distribution of electricity by Area Boards and exercising a general control of the policy of these Boards." It is satisfactory to discover that the Authority has no intention of "running" the Boards. It will prefer to advise and guide and, no doubt, the Area Boards will gladly seek assistance of this character, knowing that those at the centre will have a better general view of the situation.

Autonomy of Area Boards

This will not militate against the autonomy which the Boards will desire (and is desirable) and which the Authority will encourage to the greatest possible extent. Certain matters must be dealt with on a national basis. First come generation and main transmission, already recognized as a national matter. For this purpose an organization running parallel with the Area Boards, but distinct from them, has been set up. The Area Boards will be freed from responsibility for this work and be able to devote their whole attention to distribution and the service of the consumers. They, in turn, will delegate a great deal of responsibility to sub-areas and the latter to districts.

Labour relations and other work involving the welfare and training of employees will also be dealt with at headquarters, with suitable representation in the areas.

Indications are that the dispossessed authorities are being very helpful and are anxious to secure a smooth change-over. We wish the Authority and Boards every success, although we reserve the right to pull them up if ever they seem to be straying from the road which leads to an efficient and reasonably cheap service to the public.

Conditions of Progress

ADDRESSING the I.E.E. South Midlands Centre last Friday (see page 234), Lord Citrine expressed his belief that there were no foreseeable limits to electrical expansion. There may be obstacles, however, one of which was referred to by Sir Harry Railing. That is the curtailment of the generating plant programme for 1950 and thereafter. The increase in horse-power of motors needed to supplement man-hours to give maximum industrial productivity is many times greater than the capacity now proposed. To meet the expansion that should be envisaged in the electrical demands by industry, neither load staggering nor restrictions on other classes of consumers will go very far. To convince the Government of this may yet be the most difficult of the duties that will confront the British Electricity Authority.

Ministers and Boards

SOME of the very newspapers which envisaged too much Ministerial interference with nationalized industries are now protesting against Ministers' refusal to deal with matters which they consider fall wholly within the boards' powers. We are rather inclined to agree with the Ministers; if they began to take up points of detail operation they would have time for nothing else. Yet there are matters of broad public policy with which they must be concerned. Their difficulty arises when it is hard to determine whether any particular point is one of policy or merely a routine matter. In the meantime we suggest that Members of Parliament who consider that national boards should do, or cease to do, certain things might first approach the boards before asking questions in the House.

Electricity Supply Tariffs

WHEN it enters into its heritage at the beginning of April, the British Electricity Authority will be faced with the thorny task of devising standard tariff structures (not uniform tariffs) for consumers, smoothing out differences in charges due to geography and, at the same time, rectifying those that are found to be economically unsound. The maximum amount of autonomy promised to the Area Boards will tend to minimize hardships and permit the adjustments to take account of local circumstances. At one time coal clauses justly allowed a margin for other costs which varied with those of fuel, but recent heavy increases in coal prices have made the margin big enough for industrial consumers to carry the others.

Wages and Prices

IT is evident from the White Paper on "Personal Incomes, Costs and Prices" issued last week that the Government is seriously perturbed at the pace at which wages and costs are mounting. Apart from the inflationary danger, the effect upon export prices is proving a growing handicap. The Government realizes that it is not desirable to interfere with the incomes of individuals, except by taxation, but it calls for a general realization that there is no justification for a general increase of wages which can only result in higher prices for the present limited supply of goods. The White Paper contains a hint that where wage increases are given, the usual equivalent rise in controlled prices may not be allowed in future; thus the burden would have to be borne solely by the producers.

American Output

IT is so generally believed that American labour efficiency has advanced considerably in recent years that it comes as a shock to read the conclusions of the American National Association of Manufacturers. Since 1939, it is stated, unit output per man-hour has made a net gain of only 7 per cent while the labour cost per unit has risen by 89 per cent. A comparative study of output with installed h.p. shows that productivity has increased at only the same rate as power has been made available to each factory worker.

Furnace Temperature Control

Energy Regulator for Small Resistance Types

By G. B. Lamb,
B.Sc., A.C.G.I.

THE temperature of small electric resistance furnaces is generally regulated by a rheostat because the cost of an automatic controller is not often warranted, except for very accurate work, or when the furnace is left unattended for long periods. But a low-priced "Sunvic" energy regulator can be used in place of a rheostat to considerable advantage.

The movement of the bi-metal strip necessary to open the contacts of this form of thermal relay is regulated by a cam on the control knob spindle. In Fig. 1, the current passing through the heating winding (C) of the bi-metal strip (B) causes the latter to bend and open the contacts (A) which open-circuits the strip-heating winding and the furnace-heating element. The strip then

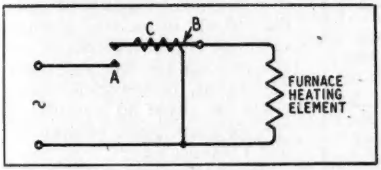


Fig. 1.—Simple furnace control circuit

cools and the contacts "make," thus starting the cycle again. The control knob rotates through approximately 270 degrees; when rotated as far as possible anti-clockwise the regulator is permanently open-circuited and at the other end of the scale is "on" continuously. Between these limits the on/off ratio is infinitely variable. The time cycle of the regulator from "on" to "on" varies according to the on/off ratio, but is of the order of 40 seconds. The contacts of the relay operate with a snap action so that it is possible to break directly a.c. loads up to 2,500 W at 250 V so enabling the energy regulator to be used without a relay for small furnaces. For furnaces with ratings above this value a contactor or relay is necessary.

Fig. 2.—Muffle furnace with energy regulator panel

The scale of the energy regulator is calibrated in divisions from 0 to 100 and it is important to realize that the divisions do not represent temperatures. Particular temperature positions of the control knob can be found by trial and error without much difficulty and, once determined, the same positions will be correct within small limits for future use. The instrument is compensated so that voltage fluctuations up to 20 per cent do not materially affect the average power for any given control knob setting.

The energy regulator is not an automatic temperature controller; its function is similar to that of a rheostat. Consequently any factor which affects the heat balance of the furnace must be compensated for by altering

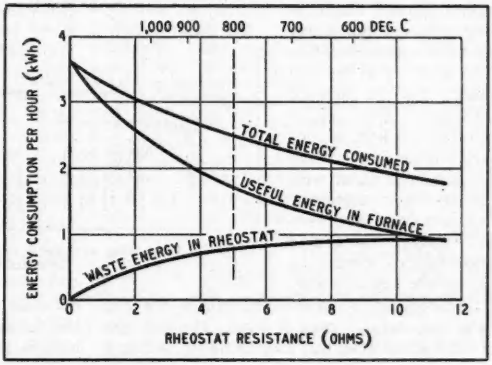


Fig. 3.—Comparison of energy consumption

the control knob setting. The factors which affect the heat balance are: Variations of ambient temperature, which will affect the heat losses slightly; opening of the furnace door, which causes greater heat losses; and insertion of a cold charge, which requires energy to raise its temperature to that of the furnace.

Any increase in the heat required by the furnace to maintain a given temperature will necessitate an increase of the electrical energy needed and consequently the control knob setting must be increased.

Considerations of low cost cause most small electric furnaces to be built on the muffle principle; that is, the heating element wire is wound round the outside of a refractory chamber with walls 0·5 to 0·75 in. (1·27 to 1·9 cm) thick. As the furnace illustrated (Fig. 2) is rated at 3·6 kW, a contactor is necessary; it is housed in a panel with the energy regulator, isolator, main and control circuit fuses and pilot lights. Owing to the muffle construction, it is necessary to make allowances for the time lag, which occurs when altering the control knob setting. For example, when a large cold charge is put into a hot furnace the control knob should be set to "full-on" until the furnace temperature again rises to within 20 deg C of the desired value. The control knob should then be set back to the correct position for that temperature, which will be regained in a short time.

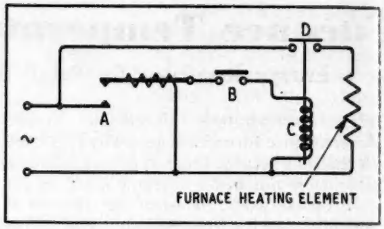


Fig. 5.—Automatic control circuit

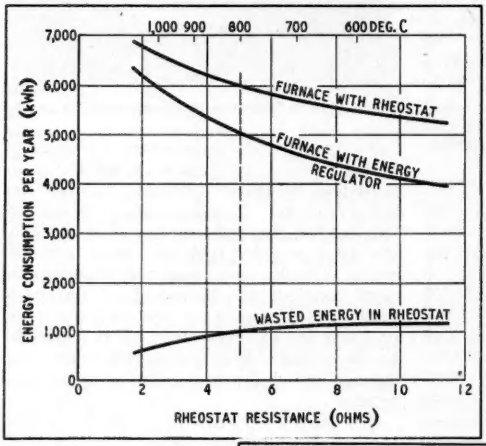


Fig. 4.—Annual energy saving

To dissipate the wasted energy and ensure a strong workshop job it is usually necessary to make the rheostat of the stud type and of ample size to incorporate two sets of studs for fine and coarse adjustment, otherwise it cannot easily be made to control the furnace temperature between 200 and 1,000 deg C.

The advantages of the energy regulator are that the temperature is infinitely variable, can be controlled between room temperature and the maximum permissible for the furnace, the space occupied is less and heat is not wasted outside the furnace.

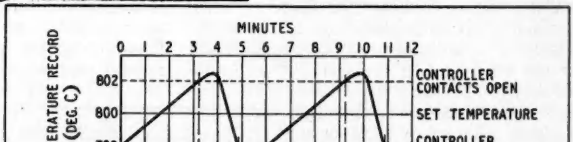


Fig. 6.—Operating sequence graph. Shaded areas represent energy supplied to furnace

The furnace illustrated has a chamber 19 by 7·5 by 5 in. high (48·3 by 19 by 12·7 cm), with a heating element (200 V single-phase) of 10·6 ohms at 20 deg C and 11·1 ohms at 800 deg C. With a rheostat (maximum) of 11·5 ohms test results (Fig. 3) show that at 800 deg C the useful energy in the furnace, which is equal to its heat losses, is 1,700 W and the energy wasted in the rheostat is 775 W. At lower temperatures the waste energy increases still further, while the ratio of useful energy to waste energy decreases even more rapidly.

If used for 40 hours a week for one year (Fig. 4) allowing 3 hr per day when the full power is used, then:—

Consumption with rheostat =	6,025 kWh at 1d. per kWh	£25	2 1
Consumption with regulator =	5,018 " " "	£20	18 2
Saving equals energy wasted in rheostat	1,007	£4	3 11

A main switch, fuses and pilot lamp for the rheostat will cost somewhat less than the regulator panel illustrated; even so, the saving in energy will be sufficient to pay for the additional cost within 2½ years and thereafter the running costs will be reduced by 20 per cent; indeed Fig. 3 shows that in continuous operation with the rheostat in circuit practically the whole time the saving will be of the order of 30 per cent.

The energy regulator can also be used in conjunction with an automatic temperature controller, purely as an energy regulator, which is particularly useful for muffle furnaces.

For certain heat-treatment processes a small furnace suffices, but it is desirable to make it automatic. In muffle furnaces, owing to the previously mentioned time-lag through the thickness of the refractory wall of the chamber, a thermo-couple millivoltmeter controller will allow fluctuation of as much as 40 deg C, particularly at low temperatures. It is necessary to provide slightly more input than is needed to overcome the heat losses. The panel illustrated is so wired that it can be used for this purpose. Thus, in fig. 5, with the automatic controller contacts (B) closed the supply to the contactor coil (C) is switched with an on/off ratio dependent on the setting of energy regulator knob. The on/off periods are passed on to the furnace element in the same ratio by the contactor (D). The regulator contacts (A) open and close at set intervals while the automatic contacts (B) open or close only when the temperature is above or below the pre-set value. Consequently the contactor coil circuit can be opened or closed by two sets of contacts operating independently, but this circumstance does not lead to difficulties, because the time interval from "on" to "on" for (A) is much shorter than that for (B) provided the energy regulator is set to give a greater average power input than that needed to maintain the furnace temperature at the automatic controller setting. The scale in Fig. 6 has been exaggerated considerably; to all intents and purposes the record is a straight line. The slight overshoot and undershoot of temperature when the contacts open and close are unavoidable with this type of controller and can be made small by adjusting the energy input as closely as possible to the heat losses.

The author is indebted to Wild-Barfield Electric Furnaces, Ltd., for permission to publish this article.

News from France

From Our Paris Correspondent

THE new Genissiat Dam on the Rhone was opened last month as part of a Government plan for expanding the electrical power industry. Work on the barrage began in 1937 but was held up by the war. The dam is situated on the Rhone 160 km upstream from Lyons and the reservoir which has been constructed is 23 km long by 600 m wide. The falls are 60 m high. When the Genissiat plant is completed, with its 416,000-kW capacity and 1,800 million kWh annual production, it will be the largest hydro-electric plant in Western Europe. The greater part of the output will be used to supply Paris and the Seine department, and 220-kV transmission cables have been constructed.

Network Interconnection

Interconnection of the 150-kV network of the Nord with the 220-kV network of Paris and the Ouest has been made at Mazingarbe, where an important thermal power station serves the surrounding mining area. For this purpose a three-phase, five-limb, 100,000-kVA transformer has been built by the Société Savoisienne de Constructions Electriques. The 220-kV winding rated at 100,000 kVA and the 150-kV winding rated at 50,000 kVA are both connected in star. The neutral of each, insulated for 50 kV, is brought out and includes a regulator with a 15 per cent range in the former case and 20 per cent in the latter. The tertiary winding of 5 or 15 kV, rated at 50,000 kVA, is connected in delta. The tank contains 100 tons of oil with forced cooling. The dimensions of the transformer are 39 ft 6 in. (12 m) long by 21 ft 4 in. (6·5 m) wide by 29 ft 8 in. (9 m) high.

National Electricity Supply

Outline of the New Organization

IN May last year the Minister of Fuel and Power appointed an Organizing Committee to prepare the ground for the operation of the Electricity Act, 1947. That Committee and the British Electricity Authority, which was established last August, have put in a tremendous amount of preliminary work. There has been so much detail to attend to that up to the present it has not been possible to give a satisfactory picture of the future organization of the electricity supply industry. Now that the vesting date (1st April) has been announced by the Minister it is appropriate to indicate in broad outline the preparations which have been made for the transfer of the 600 present undertakings.

The Authority, as our readers will know, consists of Lord Citrine (chairman); Sir Henry Self and Mr. J. Hacking (deputy chairmen); Mr. E. W. Bussey (full-time member); Dame Caroline Haslett, Alderman Sir William Walker and Lt. Col. E. H. E. Woodward (part-time members); Mr. T. Johnston (as chairman of the North of Scotland Hydro-Electric Board); and Messrs. H. J. Randall, J. Eccles, J. S. Pickles and Alderman W. S. Lewis (as chairmen of Area Boards).

Senior Officials

There are five chief officers as follows:—Secretary, Mr. H. F. Carpenter; chief accountant, Mr. D. W. Coates; chief legal adviser, Mr. R. A. Finn; chief engineer, Mr. V. A. Pask; and commercial manager, Mr. E. R. Wilkinson.

Next in order come fourteen deputy chief officers:—Two deputy secretaries, Messrs. R. Halsall and S. M. Rix; two deputy commercial managers—not yet appointed; three deputy chief engineers, Messrs. R. R. Martindale (generation), J. D. Peattie (transmission) and Mr. C. W. Marshall (research); three deputy chief accountants—to be appointed; a deputy chief legal adviser, Mr. W. Usher; a contracts manager—to be appointed; a chief labour relations officer, Mr. A. H. Banks; and a chief economics officer—to be appointed. The relationships of these officers are shown in the accompanying diagram.

On the next step of the organization are a number of officials who will perform various functions and will be responsible generally to the deputy chief officials but in some cases directly to the chief officers or members of the Authority. There are several appointments still to be made at this level. The positions filled so far include a director of establishments (Mr. D. Moffat); a chief medical officer (Dr. P. Pringle); a chief welfare officer (Mr. J. O. E. Steele); deputy labour relations officers (Messrs. G. W. Essex, W. H. Hand and T. Cochrane); a chief education and training officer (Mr. J. W. Thomas); and a public relations officer (Mr. L. J. Luffingham).

Other senior posts will probably cover generation, distribution and general statistics; economics and intelligence; tariffs; bulk supply agreements; commercial planning and development; power station design, construction and operation; progress and inspection; transmission design and construction; and system operation.

Control of Generation and Transmission

Generation and main transmission will be entirely the concern of the Central Authority and for this purpose the country has been arranged in fourteen divisions, coinciding exactly with the territories of the fourteen Area Electricity Boards (dealt with below). Although the divisions are quite distinct from the Boards, there will be close liaison between them. Each division is in charge of a controller who is responsible directly to the operation deputy-chairman (Mr. Hacking) and he and his staff also work in conjunction with the appropriate officers at headquarters.

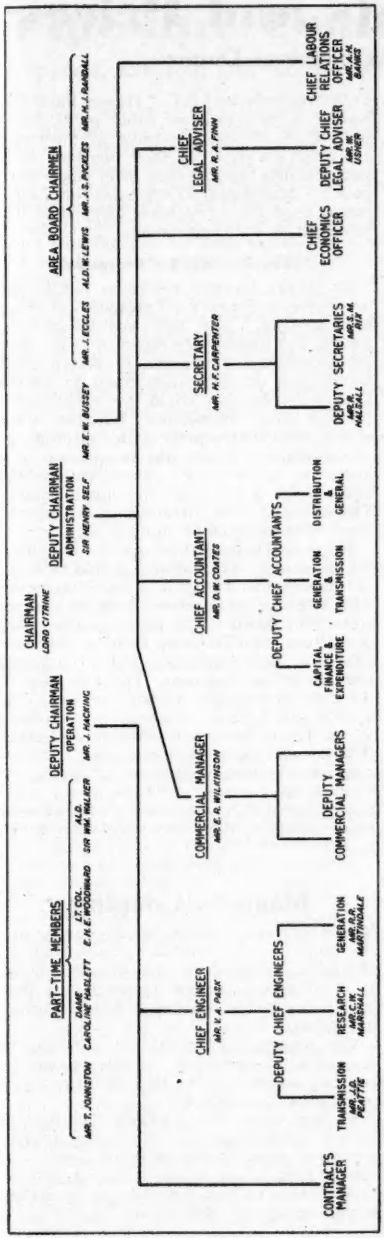
Staff relations will be administered centrally. As we have said, there are three deputy labour relations officers dealing respectively with technical and supervisory staff, clerical and administrative staff, and manual workers. The trade unions representing the employees in the above three sections will appoint representatives to one side of national conciliation councils, the other side being representative of the Authority. There will also be district councils for each of the three sections in each area. It is anticipated that other matters such as health, welfare, safety, and education and training, will be dealt with by a National Joint Advisory Council.

Area Boards

All the Area Electricity Boards are now in operation, although not all of them are fully constituted, and they are in process of

Chart showing the Authority and senior officers and their relationships

Chart showing the Authority and senior officers and their relationships



appointing their chief officials and other executive officers. The Central Authority has suggested to them that their chief officials shall bear the same titles in all areas. This will avoid possible confusion between positions in different areas and also facilitate contact between these officers and their counterparts in the national executive.

If these suggestions are followed, as they generally will be, the chairman and deputy-chairman of a board will share the main responsibility for the system. They will have four chief officials, each with four or five assistants—a chief engineer, a secretary, a chief commercial officer and a chief accountant. There will be at the same level, if necessary, a sub-area liaison officer. Other senior officers will be a purchasing officer and a labour relations officer.

It will be necessary for efficient operation and administration to divide the Areas into sub-areas. The number of these will naturally vary according to the extent and population of the Areas. For instance, populations range from 1,280,000 in the case of South-East Scotland to 6,273,000 in the London Area and areas from 126 sq miles (South-East Scotland) to 1,049 sq miles (Eastern Area). It is thought that six may be an optimum number in most cases.

Each sub-area will be under a manager who will have with him a consumers' engineer, a sub-area engineer, a sub-area storekeeper, a meter and test engineer, a sub-area accountant, a sub-area secretary and a sub-area labour relations officer.

To secure the desired intimate contact with consumers the sub-areas will be further divided into districts, each with a district engineer and consumers' representative.

Consultative Councils

The Electricity Act provides for the establishment in each area of a Consultative Council with between twenty and thirty members representative of local authorities (between half and two-fifths of the membership), agriculture, commerce, industry, labour and "the general interests of consumers of electricity and other persons or organizations interested in the development of electricity in the area." The duties of these Councils are manifold but may broadly be described as studying the consumers' needs and advising the Area Boards upon the means of meeting them. The members are to be appointed by the Minister. So far no announcements have been made but consultations are proceeding.

Electricity Costs and Prices

Speeches at I.E.E. Birmingham Dinner

SPEAKING at the annual dinner of the South Midlands Centre of the Institution of Electrical Engineers on 6th Februarv, LORD CITRINE (chairman, British Electricity Authority) said that one of the duties of his Authority was to ensure that the revenues of the otherwise substantially autonomous Boards covered their expenditure. Recent increases in coal, labour, transport and capital costs had resulted in actual or prospective losses to many undertakings. Capital costs per kW had increased from between £13 and £20 before the war to £45 now. Rises in prices to consumers must therefore be contemplated, and would in any case have been necessary under the present ownership. The granting of rebates to consumers by certain local authorities had aggravated the position, and the assets transferred to the Boards would be substantially less than was contemplated when the Bill was before Parliament. It would be unfair, therefore, to blame nationalization for increases in price.

Squaring up Tariffs

The widening disparity in charges to industrial and domestic consumers would have to be redressed. Tariffs would not necessarily be uniform throughout the country or even within a given area, but it was hoped to simplify them. Differences between the methods adopted by the Area Boards were to be expected. Experience alone could indicate the limits of decentralization.

While the Minister of Fuel and Power had to have regard to local government, industry, commerce, agriculture, finance and applied science in setting up the Boards, the dominating characteristic was the electrical experience of their members; this applied to 23 out of the 28 chairmen and deputy-chairmen, and to 46 out of 74 other members. He believed that the Consultative Councils representing consumers would be a real help to the Boards. Mistakes would be inevitable in a new organization, and those of the B.E.A. would be exposed to the searchlight of Parliament. With the co-operation of the manufacturers, the public interest could be safeguarded without recourse to the power given to the Central Authority to manufacture plant.

MR. PERCY GOOD (President, I.E.E.) said that charges of exploitation of the community usually arose from imperfect knowledge. The expansion of the industry was due to the amounts spent on research, in which both manufacturing and supply interests were on the same side of the fence. The Institution provided the keystone for planning for the whole industry and also opportunities for full and free expression of opinion. He suggested that the gift of the City of Birmingham of £1,000 towards the I.E.E. " Homes Fund " was worthy of emulation by other public bodies. MR. W. S. BURGE (chairman of the Centre) expressed the view of those working in the electrical industry that their main object was its benefit. Manufacturers depended for ability to export upon the active home demand that was furnished by the supply side.

Requirements for Prosperity

SIR HARRY RAILING (chairman, G.E.C.) gave four requisites for national prosperity as affected by electricity. The first was an abundant supply, and therefore he regarded as ill-advised the Government's decision to curtail capital expenditure on generating plant in 1950-51. Greater production could be achieved only through more man-hours, but the worker needed more horse-power at his disposal, and conservation of labour was as necessary in the home as in industry. Sacrifices could be endured for a few years but not indefinitely. The industry must strengthen Lord Citrine's hand when he asked for more plant.

His second point was the need for low charges for electricity. The industry should be treated not as sheltered but as a competitive industry with wages on an economic level and overhead costs kept down. The need remained for a prosperous manufacturing industry that could afford to make mistakes and to undertake research and development. The third point was the need to keep the industry out of politics, and in this he was supported by ALDERMAN W. S. LEWIS (chairman, Midlands Electricity Board), who spoke subsequently. The final essential was the maintenance of the hitherto harmonious co-operation between the supply and manufacturing sides. MR. C. F. PARTRIDGE (past chairman, South Midland Centre), also spoke.

Magnetic Couplings

THE magnetic coupling, or eddy current drag, which is usually employed as a clutch or variable speed slipping device, was described by MR. H. S. CARNEGIE (English Electric) in a paper read last week before the Belfast Association of Engineers.

The author commenced by outlining the principles of operation, continuing with an account of various types, their performance and mechanical construction.

In conclusion Mr. Carnegie described the various applications to which this device is suited, such as marine and fan drives, eddy current braking and means of smoothly starting heavy torque or high inertia loads from Diesel engines or squirrel cage motors.

Pipe-line Communications

Speech, Printing and Telemetering without Physical Lines

REFERENCE was made in our last issue to the installation of a pipe line projected for conveying oil from the northern end of the Persian Gulf westward across the Arabian Desert to a port on the Mediterranean. The means of communication to be provided over the 800-mile (1,288-km) route will be entirely "wireless," with facilities for both speech and teleprinter working without buried cables or overhead lines.

The system will be unique in that all communication as well as distant supervisory control operations will be conducted over radio links, during the initial constructional period and after completion of the pipe line for administrative and maintenance service operational purposes. The specialized equipment is being manufactured by the General Electric Co., Ltd.

The contract value approximates to £300,000, being the largest of its kind ever placed and the G.E.C. scheme was chosen from among several British and American tenders. The consulting engineer for the scheme is Mr. Wilson Finding, who was an engineer with the British Broadcasting Company in the very early days of broadcasting.

During the initial period communication will be required between the base camps and the construction camps over distances up to 150 miles (241 km) and from there to working parties over a few miles. Communication is also required with aircraft and with vehicles travelling between the camps. For this purpose each camp will have an amplitude-modulated h.f. transmitter with a choice of two crystal-controlled frequencies selected by means of a switch; also two crystal-controlled receivers pretuned to those two frequencies, to be used alternatively for day and night working.

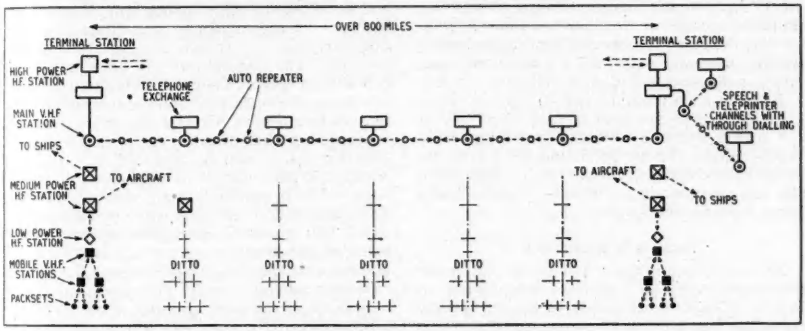
The installations at the base camps will be semi-permanent; those at the construction camps will be mounted in vehicles each of which will also house batteries for standby operation and a petrol-electric generator for running the transmitter and charging the batteries. Also installed in each vehicle will be a frequency-modulated v.h.f. transmitter/receiver, which has a sending output of 20 W. These sets will communicate with the working parties, which will use battery-operated pack sets having a transmitter output of 0·25 W. The vehicles will accommodate aircraft-type equipment operated from the truck's battery. The transmitters will be crystal controlled and have a power output of 25 W, while the receivers will be tuned and locked on the frequency in use.

The equipment will be totally enclosed and sealed against dust and weather. When such protection is impracticable, cooling will be by blowers drawing air through dust filters.

Simplex working, needing press-to-speak switches in the hand-combination sets, is to be used; once the equipment has been installed its operation will be almost as simple as that of an ordinary telephone system.

When the construction of the pipe-line is completed the mobile radio trucks and the packets may be increased in number and used by maintenance and repair parties. Each oil pumping station will permanently house equipment similar to that installed at the base camps. The terminal stations will be similarly equipped, except that there the transmitters will be grid-modulated and will have an output of 1 kW on c.w. and of 250 W on m.c.w. or speech. Selection of any one of six crystal-controlled requencies or a very stable variable-frequency oscillator will be possible by the operation of a simple switch.

In addition, each terminal and oil pumping



Schematic representation of typical terminal and intermediate points of communication

station will have a 150-W amplitude-modulated transmitter, chiefly for communicating with aircraft, over the 300-600 kc/s band with provision for three crystal-controlled frequencies or a variable-frequency oscillator. High grade " communications type " receivers, covering the 150 kc/s to 33 Mc/s band and suitable for speech, c.w. or m.c.w., will also be provided at all stations.

To ensure constant and reliable service there will be between each pair of adjacent stations six (both-way) speech channels and six (both-way) teleprinter channels on v.h.f. links.

The choice of v.h.f. radio for these links was governed by several factors. The nature of the country precludes the use of physical circuits between stations; fading and noise on m.f. and h.f. radio circuits and the improbability of obtaining a sufficient number of frequencies ruled out the remaining possibilities. The most attractive was to use multi-circuit telephone carrier equipment employing, instead of physical circuits, wide band frequency-modulated v.h.f. links which reduce distortion and are unlikely to cause or to suffer from interference, so that the same frequencies can be used again within comparatively short distances and, additionally, reasonable aerial gains are possible.

Between each adjacent pair of stations seven channels will be provided in each direction, six for speech and the seventh for a number of voice-frequency telegraph circuits to form the six teleprinter channels, six dialling channels and the remote metering channels, together with other facilities and spares.

Automatic Exchanges

At every station there will be an automatic telephone exchange. Certain telephones on these exchanges must be barred from using the trunk circuits, while others must be able to dial directly to a number on their own or any other station. Some executive officials, if the number dialled is engaged, must be able to break in on the existing connection to speak to the party they require. The exchanges will be of standard construction except that a special register will receive calls from other stations to translate dialled impulses into a suitable code for selecting the required station and for selecting a telephone on that station.

The teleprinters at any station will be able to connect themselves automatically to others at any distant station. Finally, the readings of certain meters associated with the pipe-line itself will be collected from every station and displayed at all stations continuously and automatically.

As the distances between stations are too great for direct connection by v.h.f. links, intermediate repeater stations must be provided. To keep their number down to the minimum, the most suitable sites will be selected by survey. High, self-supporting, steel masts will be built to carry aerials giving a gain of 12-15 db. The repeater stations will be unattended and will have their own diesel-electric power supplies. Except for the masts and the aerials, all the equipment will be duplicated and failure of the main set will cause the spare automatically to be taken into use. Simultaneously an alarm will be extended over a service channel to the parent exchange. This service channel can also be used by maintenance personnel for speech transmission.

The repeaters are, in effect, high-gain amplifiers and frequency changers with crystal control so arranged that crystal frequency drift will have little effect. In all stations, including the repeaters, the useful sensitivity of the receivers will be of the order of a few microvolts and the power output of the transmitters approximately 100 W.

For administrative purposes, in addition to the v.h.f. links, two both-way speech circuits and two teleprinter circuits are required in each direction between the terminals. On the speech circuits through dialling with normal telephone-like operation from automatic exchanges at each end is specified. This service will be provided by two v.h.f. radio links in both directions, each one carrying one speech and one teleprinter channel. The transmitters will have an output of 1 kW on speech, anode modulation with very low distortion and six (crystal-controlled) switch-selected frequencies. Crystal-controlled receivers arranged for triple-diversity reception and highly directive aerials will be provided at each end. Automatic gain control of the audio-circuits at both ends will ensure constant modulation level and freedom from singing, while privacy equipment will prevent intelligible speech being received by other listeners. A novel form of dialling over the radio links has been developed to ensure reliability under the worst conditions.

Because of the great quantity of oil involved, a breakdown of communication would involve a large financial loss. The variety of methods to be provided should make a complete failure very unlikely, alternative routes being available in the event of failure of the main route. The system is, and must be, complex, but the component parts have already been well proved in practice.

C.I.G.R.E. Conference

THE International Conference on Large Electric Systems (C.I.G.R.E.), will be held in Paris from 24th June to 3rd July next. Matters appertaining to the British delegation are dealt with by the British National Committee, under the chairmanship of Mr. P. V. Hunter, for which the E.R.A. acts as secretariat. The official languages of the Conference will be English and French only. A provisional list of papers will be issued shortly. In view of difficulties of accommodation, intending delegates should communicate with Mr. R. A. McMahon, secretary, British National Committee, C.I.G.R.E., " Thorncroft Manor," Dorking Road, Leatherhead, as early as possible.

Views on the News

Reflections on Current Topics

A NEW meaning was lent to the word "buffet" by the social function of the I.E.E. Measurements Section on 3rd February, when Mr. D. C. Gall took the chair at a gathering of 270. The event showed that musical and histrionic talent, as well as anecdotage, were by no means foreign to the engineering temperament. The presidential description by Mr. Percy Good of the meetings of the Sections (individually equal to important technical associations) as part of an arch of which the ordinary meetings provided the keystone seemed to be apt to this occasion as well as to those of a more austere kind. The highlight of the evening was Dr. T. E. Allibone's account of his two war years in the United States. The completely harmonious working together of British and American atomic scientists once more illustrated the essentially greater importance of common interests compared with differences in methods of approach to them.

* * *

I hope that things are not really so bad in a certain area as the local electricity supply engineer recently suggested. According to the *Electrical Contractor* this gentleman, discussing installation work in the district, said that there were approximately 300 electricians employed in local steel works and these represented *some* of the unofficial electrical contractors with whom he had to deal. Small wonder that there are wide variations in the quality of electrical installations.

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Water-power is often as undependable as coal supplies and countries relying upon it have also had their "power crises." They are also suffering from inadequacy of plant as we are and for similar reasons—wartime delays in production combined with timid estimates of future needs. Sweden, for instance, does not expect to catch up with the demand until 1950. Although there was a relatively satisfactory balance between load and plant capacity at the end of the war, *Swedish Foreign Commerce* says: "By that time hesitation was observable in starting to build up new power plants—due in part to the uncertainty that prevailed in face of post-war developments. It was generally expected that the increase in load would slow down a year or two after the end of hostilities in Europe. . . . When towards the end of 1946 it was realized that the load would continue to rise . . . very big schemes were started in Sweden." Thus we are not the only electrically shortsighted country.

* * *

Utility power stations are advocated by Mr. George Wadsworth, M.P. In a letter to *The Times* he reflects upon the many million pounds being spent upon building and civil engineering work in connection with new stations and urges the Government to see that there is no extravagant use of men and materials. He objects to "cathedrals" in concrete or brick for housing machinery and considers that a 10-ft brick wall (high not thick) with a temporary cladding of prefabricated sheeting would provide adequate protection for the plant and would save precious time, money, labour and materials. Would Mr. Wadsworth drag us down to the aesthetic level of the gas industry? And is he aware that even power cathedrals are objected to as eyesores by some planning authorities? Temporary houses are bad enough; do not let us run up our public buildings on the same lines.

* * *

From time to time I have commented on the confusion likely to be caused by the use of the initials of the British Electricity Authority. In this connection it is rather interesting to learn that Mr. J. W. Thomas, secretary of the British Engineers' Association, has been appointed education and training officer to the Authority—he thus goes from B.E.A. to B.E.A. If it had been an overseas appointment he could have flown by the other B.E.A.

* * *

"Take care of the sounds and the sense will take care of itself" seems to be the motto of many sub-editors of daily papers. Two samples of headlines noticed last week were, first, that attached to the announcement of the vesting of electricity undertakings in the new organization on 1st April—"Plug-in Day" (*Evening Standard*). The other related to the E.R.A. study of large-scale wind-power generation—"Labour Plans Windmills" (*Daily Mail*).—**REFLECTOR.**

Electrical Horticulture

Soil-Warming and Glasshouse Heating

SOME of the ways in which electricity can be, and is, being employed in horticulture are commented on in a paper prepared by MESSRS. C. A. CAMERON BROWN (Edmundsons Electricity Corporation) and E. W. GOLDING (E.R.A.) for the Installations Section of the Institution of Electrical Engineers.

The authors commence with soil heating in various ways for different purposes, mentioning recommended watt-hour "dosages" per sq ft of soil area. It is an economical way of producing localized warmth in particular instances and sometimes results in other economies; for example, it may reduce the need for space heating in glasshouses. The latter at present can be employed with justification only in certain cases, principally high-grade propagating houses and the amateur's greenhouse.

General rules cannot be laid down for successful soil warming under all conditions, but precise recommendations can be made for the cultivation of salads in frames during the early months of the year. Reliable information is also available about its use for certain other purposes, such as in propagating frames and for the pre-warming of tomato-house soil.

The main reason, in the authors' opinion, why soil warming has not been more extensively employed is that growers set out to maintain, with the aid of a thermostat, a given temperature in the hot bed without knowing whether such a constant temperature is needed. The authors declare that constancy of soil temperature is in fact useless without corresponding control of other growth factors.

Potential Space-Heating Load

Turning to space heating within glasshouses, it is explained that some 1,100 kW per acre (2,717 kW per hectare) would be required to maintain 55 deg F (13 deg C) in commercial tomato houses. There are 720 acres (291 hectares) of the latter in the Lea Valley alone and any appreciable diversity cannot be expected. To maintain them at that temperature during an average March, in which month heating for early and main crops overlaps to the maximum extent, would need 200,000 kWh per acre (494,000 kWh per hectare). On a national scale the major tomato-growing holdings might represent a connected load of 3·7 million kW and a consumption of 220 million kWh in the month of March alone.

The authors do not therefore venture to examine the implications of space heating in glasshouses by electricity. They content themselves with consideration of design and available types of heating equipment. It is quite impossible to forecast accurately the likely running cost of such an installation. All that can be done is to base an estimate on some past sample period. For that purpose the authors consider the "degree day" method as interpreted by Mr. R. Grierson to be the best.

The paper concludes with explanations of soil, plant and bulb sterilization by electrical methods with references to the appliances devised by the E.R.A. for those purposes.

Electricity Loans

Notification of Area Boards

CIRCULAR letters have been sent by the Electricity Commissioners to local authority undertakings elucidating the position with regard to borrowing now that the vesting date has been announced.

It is stated that any sanction to borrow which remains unexercised at the vesting date (1st April) will become inoperative. In view of the short space of time it is considered that no useful purpose will be served by submission of new applications for loan sanctions unless there is reasonable likelihood of the sanction being exercised in whole or part, before the vesting date or sanction is required as statutory cover for entering into commitments such as the placing of contracts before that date.

While there should be no hold-up in the carrying out of essential development, such development must be considered in relation to the planned development of the larger areas for which the Electricity Boards will be responsible. This consideration applies particularly to new h.v. transmission schemes; new workshops, offices and showrooms; and relay systems for automatic control of street lighting, etc. It is considered, however, that the Boards should also have an opportunity of considering any other proposals involving substantial expenditure. Therefore all public authorities are asked to refer to the appropriate Area Board any proposal to incur expenditure of more than £10,000 on specified works of a capital nature before applying to the Commissioners for authorization or sanction. The Commissioners propose to deal in this way with applications at present before them. For unspecified works the Commissioners propose to limit sanctions to what would be the undertakings' normal requirements up to 30th September, 1948, but undertakings should still consult the Boards to ensure that any proposals for ultimate standardization will not be prejudiced.

The foregoing arrangements do not apply to applications for loan sanctions in respect of capital expenditure on generating stations or the grid and the Commissioners will continue to issue necessary consents as quickly as possible.

Company undertakings have been sent a copy of this letter and are asked to adopt a similar procedure where the authorization of the Commissioners is required, e.g., under No. 56A of the Defence (General) Regulations. The Commissioners also hope that the companies will consult the Electricity Boards concerned before placing substantial orders.

PARLIAMENTARY NEWS

By Our Special Reporter

MR. GAITSKELL, Minister of Fuel and Power, told the House of Commons on Friday last that after consultation with the British Electricity Authority, he had come to the conclusion, with the agreement of the Secretary of State for Scotland, that the vesting date under the Electricity Act, 1947, should be 1st April next. He had made an order that day (6th February) giving effect to this conclusion.

Bankside Power Station

Mr. Keeling asked the Minister of Fuel and Power what progress had been made with the experiments for eliminating sulphur from oil fuel; and whether he could confirm the assurance given by the Government in May last that such elimination was a *sine qua non* of the scheme for an oil-burning power station at Bankside.

Mr. Gaitskell said that pilot gas-washing plant which would be used to determine the most efficient type of installation for the Bankside power station was expected to be ready for operation by June of this year. The answer to the second part of the question was in the affirmative.

Mr. Keeling asked the Minister to explain why the work on Bankside appeared to be in progress if this *sine qua non* had not yet been achieved? Mr. Gaitskell said he would look into it, but he could give an assurance again that it would not be completed unless he was satisfied that no sulphur fumes would be produced.

Mr. Skeffington-Lodge asked the Minister to give an assurance again that in no circumstances would there be an attempt to rebuild or enlarge the Bankside power station to run it on coal. Mr. Gaitskell said those assurances had been given more than once, and he was happy to repeat them.

Hearing Aids

Mr. Erroll asked the Minister of Supply what encouragement he was giving to the British hearing aid industry to increase their exports.

Mr. Jack Jones said that hearing aid manufacturers were themselves planning to increase their exports and had been allocated all the controlled materials they needed for export orders. Both the Ministry of Supply and the Export Promotion Department of the Board of Trade had given and would continue to give manufacturers all the help they could to increase exports.

Mr. Erroll asked the Lord President of the Council what steps he had taken to improve the "Medresco" hearing aid by further research and development work.

Mr. H. Morrison said that until there had been practical experience of the model now in production the question of improving the design would not arise, but the scientific committee concerned was already considering proposals for new types of receiver and the possibility of other instruments for forms of deafness requiring special treatment.

Electricity in Uganda

Mr. Erroll asked the Secretary of State for the Colonies on what basis the chairman of the Uganda Electricity Board was selected and why extensive monopoly powers had been granted to the Board.

Mr. Creech Jones said that the chairman was considered particularly suitable in view of his technical qualifications, his experience in managing large electricity public undertakings in the United Kingdom and the knowledge he had obtained of hydro-electric supply problems in East Africa. The powers conferred on the Board were a natural corollary of the resolution of the Uganda Legislative Council to set up a public corporation to control the generation, transmission and distribution of electricity supplies in the Protectorate.

Grampian Company's Scheme

Mr. Thornton-Kemsley asked the Minister of Fuel and Power if he was aware that the Grampian Electricity Supply Company was unable to proceed with its plans for the provision of a supply of electricity at Muchalls, Kincardineshire, where it was urgently needed.

Mr. Gaitskell said that there was an acute shortage of wooden poles and the issue of licences was accordingly limited to certain priority categories. These categories included food production, but the application in question was almost entirely for domestic purposes.

Gasification of Coal

Mr. R. Robinson asked the Minister of Fuel and Power what information he had received from his representatives who visited the United States and studied the experiment in the underground gasification of coal at the Gorgas Mine of the Alabama Power Company; and whether it was proposed to make a similar experiment in this country.

Mr. Gaitskell said the representatives of his Department and of the Department of Scientific and Industrial Research were present at the conclusion of the underground gasification experiment at the Gorgas Mine, a full account of which had now been published by the United States Bureau of Mines. The question of conducting a similar experiment in this country was under consideration, but no decision on whether experimental work would be justified at this stage had been reached. Officers of the Fuel Research Station of the Department of Scientific

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and Industrial Research had been in close touch with the Belgian scientists who were planning an experiment on underground gasification, and one of them visited the site last month. There was a considerable amount of published information on the Russian research and experiments, but it had not been possible to get into direct touch with the scientists concerned.

London Railway Electrification

Mr. Gammans asked the Minister of Transport to what extent the cut in capital expenditure would involve the postponement of the electrification of the railway from Finsbury Park to Muswell Hill; when it was expected that this work would be completed; and if in the meanwhile he would arrange for a diesel service to King's Cross and Broad Street.

Mr. Barnes said he was afraid it would involve the further postponement of this scheme; he could not say for how long. The question of a diesel service to King's Cross and Broad Street was a matter for the British Transport Commission, whose attention he was drawing to the question.

Midnight Broadcasting

Mr. H. D. Hughes asked the Postmaster-General what he estimated would be the cost of fuel and power incurred in allowing the B.B.C. to resume broadcasting until midnight; why the B.B.C.'s recent request to resume this service was rejected; and if he was prepared to reconsider this matter.

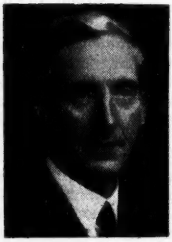
Mr. Paling said that the direct cost in the transmitters and receiving sets was estimated at approximately 60 tons of fuel per day. The indirect cost in domestic heat and light could not be calculated but would probably be greater. The B.B.C.'s recent request was rejected in view of the general fuel situation and he thought it was too early to reconsider the matter.

PERSONAL and SOCIAL

News of Men and Women of the Industry

THE British Electricity Authority has selected a team well balanced in experience and talent for the task of building up its public relations organization. **Mr. L. J. Luffingham,** editor of

Mr. L. J. Luffingham



Mr. J. W. Thomas

the *Electrical Times*, becomes public relations officer, and the two deputy public relations officers appointed are **Mr. W. J. Hendry,** press liaison officer of the Central Electricity Board since 1933, and **Mr. G. Grant McKenzie,** a former Director of the Information Office, British Embassy, Washington. Mr. Luffingham, has had nearly thirty years' experience of technical journalism and of the electrical industry, and has been progressively editorial assistant, chief technical assistant and editor of the *Electrical Times*. Mr. Hendry, before taking up his present appointment, was for over twenty years in journalism, with experience in Fleet Street and the Parliamentary Press Gallery. Mr. McKenzie, whose term in Washington extended from 1943 to 1946, is a B.Sc. (Econ.) of London University and has had experience in the Labour Party information and research activities in local government affairs.

The B.E.A. has appointed **Mr. J. W. Thomas,** B.Sc., LL.B., M.I.E.E., Barrister-at-Law, as its chief education and training officer. Mr. Thomas who is secretary of the British Engineers' Association, was formerly assistant general secretary of the Electrical Power Engineers' Association.

The London Electricity Board has appointed **Mr. D. Gray** of the County of London Electric Supply Co., Ltd., as chief accountant, **Mr. R. Lee,** M.I.E.E., A.M.I.Mech.E., of St. Pancras, as sub-area liaison officer, and **Mr. H. C. Spence,** M.I.E.E., M.I.Mech.E., of Wimbledon, and **Mr. H. C. Wells,** M.I.E.E., A.M.I.Mech.E., of the County of London Electric Supply Co., Ltd., as deputy chief engineers.

A number of appointments have been made by the Yorkshire Electricity Board. **Mr. S. R. Siviour,** M.I.E.E., who has been appointed chief engineer, is deputy general manager of the Yorkshire Electric Power Co., with which company he has been associated since 1911. He was previously with Callender's Cable & Construction Co., Ltd. Mr. Siviour is a past chairman of the Transmission Section and the North Midland Centre of the I.E.E. **Mr. A. Haslehurst,** A.L.A.A. (commercial manager and deputy chief official, Bradford Electricity Department) has been appointed chief commercial officer to the Board, **Mr. J. M. Dodds,** LL.B. (town clerk of Harrogate) secretary, and

Mr. S. R. Siviour

Mr. E. Van Ham, A.I.M.T.A., A.C.I.S., A.S.A.A. (deputy city treasurer, Bradford) chief accountant.

The Board has appointed the following sub-area managers:—No. 1 sub-area (Bradford): **Mr. T. H. Carr**, M.Inst.C.E., M.I.Mech.E., M.I.E.E. (electrical engineer and manager, Bradford). No. 2 (Huddersfield): **Mr. F. A. Ellis**, M.I.Mech.E., M.I.E.E. (borough electrical engineer and manager, Huddersfield). No. 3 (Sheffield): **Mr. J. R. Struthers**, M.I.E.E. (general manager and engineer, Sheffield). No. 4 (Leeds): **Mr. F. Nicholls**, M.I.E.E. (general manager and city electrical engineer, Leeds). No. 7 (Grimsby): **Mr. D. R. Williams**, B.Sc., M.I.E.E. (borough electrical engineer and manager, Grimsby). The appointments of managers for sub-areas Nos. 5 (Doncaster), and 6 (Hull) are under consideration.

Mr. D. P. Sayers

Mr. D. P. Sayers, B.Sc. (Hons.), M.I.E.E., M.I.Mech.E., whose appointment as chief engineer to the Midland Electricity Board was reported in a recent issue, is deputy chief engineer and manager at Birmingham. He commenced his career with British Insulated Cables, Ltd., and later served with Twiss & Partners, consulting engineers, and then with Kennedy & Donkin, being sent to Northern Ireland as chief assistant engineer in charge of all constructional work for the electricity scheme there. From 1936 to 1943 he was with the Sheffield Electricity Department.

Mr. A. G. Connell, M.I.E.E., M.I.Mech.E., chief engineer and manager of the Halifax undertaking, has been appointed chief engineer to the East Midlands Electricity Board. Other appointments made by the Board are as follows:—**Secretary, Mr. P. H. De Keyser**, secretary to the Derbyshire & Notts Electric Power Co.; **chief commercial officer, Mr. N. F. Marsh**, M.A., M.I.E.E., engineer and manager, Mid-Lincolnshire Electric Supply Co.; and chief accountant, **Mr. J. S. Nodes**, A.C.A., district accountant, C.E.B. (Central England Area).

Mr. A. G. Connell

The following further appointments have been announced by the South Eastern Electricity Board:—Deputy chief engineer: **Mr. W. E. Gibbs**, M.I.E.E. (regional manager, County of London Electric Supply Co., Ltd.); purchasing officer: **Mr. C. Boyles** (purchasing manager, County of London Co.). The Board has appointed the following sub-area managers:—Northern sub-area: **Mr. T. A. D. Honnor**, M.I.E.E. (regional manager, County of London Co.). South Eastern sub-area: **Mr. N. Boydell**, M.I.E.E., A.M.I.Mech.E. (borough electrical engineer, Eastbourne). South Western sub-area: **Mr. H. Pryce-Jones**, M.Eng. (Liv.), M.Inst.C.E., M.I.E.E. (electrical engineer and manager, Brighton Corporation). Eastern sub-area: **Mr. H. F. Knell**, M.I.E.E. (regional manager, Kent Electric Power Co.). Western sub-area: **Mr. C. W. Hughes**, B.Sc., M.I.E.E. (assistant chief engineer, London and Home Counties J.E.A.).

Mr. G. W. E. Gray, A.M.I.E.E., chief technical assistant with the Bethnal Green Electricity Department, has been redesignated acting chief electrical engineer, and **Mr. V. F. Cook**, previously commercial assistant, has been redesignated as acting general manager; both of these appointments date retrospectively from 18th October, 1947. Mr. Gray's salary is to be in accordance with the July, 1941, agreement between the National Joint Committee of Local Authorities and Chief Electrical Engineers.

Mr. G. W. E. Gray

The Board of Trade announces that in view of the increasing responsibilities of the director of the British Industries Fair (**Mr. R. E. J. Moore**) the Export Promotion Department of the Board has appointed **Mr. W. H. Young** to be deputy-director of the Fair. Mr. Young has been associated with the organization of the B.I.F. in London since 1922.

Mr. A. J. A. Owen has been appointed consumers' engineer to the Milford Haven U.D.C.

An application of the city electrical engineer of Leeds, **Mr. F. Nicholls**, for payment of salary in accordance with the agreement of the National Joint Committee of Local Authorities and Chief Electrical Engineers has been refused by the Establishment Committee of the City Council. It was stated afterwards that the Committee would not agree to the payment of salary based on output. If the application were granted the salary of the electrical engineer would be increased by £600 and would exceed that of any other Corporation official except the town clerk.

Mr. J. P. D. Coleman, who has retired from Wild-Barfield Electric Furnaces, Ltd., joined the National Telephone Co. in 1896. It was here that he first met, and served under, the late Mr. E. P. Barfield, an association which, with only a short interruption, was to continue until the latter's death in 1939. After completing his

apprenticeship, he saw a period of sea-going service, and was later with Siemens Bros. & Co., and Siemens Bros. Dynamo Works. After war service Mr. Coleman rejoined Mr. Barfield in 1919 as works manager in the furnace manufacturing business. He became works director of Wild-Barfield Electric Furnaces, Ltd., in 1933 and in 1938 joined the board of the associated company, G.W.B. Electric Furnaces Ltd. During the recent war, he volunteered and served for a short time with the R.N. motor fishing vessels. In 1945, he gave up active day-to-day participation in the business remaining on the boards of both companies, but ill-health has compelled him to retire.

Mr. A. J. C. DeRenzi, who has been engineer and manager of the Newcastle-under-Lyme electricity undertaking for forty years, is to retire in June next.

Mr. G. H. Fletcher, M.I.E.E., M.I.Mech.E., chief engineer and manager of the Metropolitan-Vickers Attercliffe Common works, Sheffield, has been appointed to the board of the Metropolitan-Vickers Electrical Export Co. Ltd.

Mr. L. A. Dennis, electrical engineer and manager to the Heckmondwike U.D.C. Electricity Department, has obtained an appointment with the Electricity Supply Commission of South Africa.

Major G. L. Bradley, representative at Hexham for the North-Eastern Electric Supply Co., Ltd., for five years, is to retire. He has been connected with the company for thirty-five years.

Mr. B. W. Radcliffe, M.I.E.E., formerly with A. Reyrolle & Co., Ltd., has joined the staff of Neale & Partners, Ltd., Newcastle-upon-Tyne, and has been appointed to the board.

Mr. T. A. Mugford has left the County of London Electric Supply Co., Ltd., with whom he was regional consumers' engineer in North Essex. He joined the company in 1930 and was in the Royal Corps of Signals during the war attaining the rank of lieutenant colonel. He has now been appointed manager of Magnetic Devices, Ltd., which is starting immediately to manufacture relays under licence from the Guardian Electric Co. of Chicago.

Mr. F. H. Bunn, director and general sales manager of Hoover, Ltd., was recently presented with a gold watch in recognition of twenty-five years' service with the company. The presentation was made by Mr. C. B. Colston, chairman and managing director of the company.

Mr. G. Cholerton, senior assistant in the installation department of Derby electricity undertaking, has retired after thirty-three years' service. He was presented with a wallet of notes by Mr. H. L. Jones, installation superintendent, at a recent dinner at which Mr. F. H. Pooles, chief engineer and manager, presided.

The Liverpool Electric Power and Lighting Committee recommends the appointment of **Mr. K. B. Harrison** as chief technical assistant (structural and mechanical), in the Electric Supply Department. **Mr. T. A. G. Madden** is to succeed him as assistant technical engineer (structural and mechanical).

On 4th February the **Rochdale Electric Co., Ltd.,** celebrated its jubilee (1898-1948) by entertaining the employees to a dinner and entertainment at the Masonic Rooms.

Obituary

Lord Derby.—We regret to report the death, on 4th February, of Lord Derby who, among his many public offices, held the position of president of the British Electrical and Allied Manufacturers' Association for many years.

Mr. F. S. Button, of the Amalgamated Engineering Union, died on 8th February. He was a member of the national executive of the Electrical Association for Women and of the council of the Women's Engineering Society.

WILLS.—Col. William Parker, D.S.O., chairman of Electric & General Investment Co., left £37,440 (net personalty £29,504).

Mr. F. S. Heys, retired chartered electrical engineer, left £11,620 (net personalty £11,540).

Mr. A. M. Pooley, a former general and works manager of the fusegear section of the English Electric Co., Ltd., Stafford, left £7,843 (net personalty £7,533).

Mr. J. W. Faithful, retired electrical engineer, left £2,235 (net personalty £2,201).

Sir Arthur Stanley, chairman of Lancashire United Transport & Power Co., left £133,762 (net personalty £125,364).

Mr. C. G. Cadman, M.I.Mech.E., late Engineer-in-Chief, Post and Telegraph Department, Malaya, left £1,895 (net personalty £1,823)

Mr. W. Densham, electrical engineer, late of the Marconi Co., left £4,255 (net personalty £4,206).

Mr. T. M. E. Ward, meter superintendent, Nottingham Corporation Electricity Department, left £5,757 (net personalty £5,025).

Efficient Water Heating

THE high efficiency of properly designed electric water heating installations which far exceeds that of many modern solid fuel fired installations was remarked upon by MR. PHILIP HONEY (E.D.A.) when he opened a discussion on this question at last month's meeting of the Coventry Electric Club presided over by Mr. F. W. Godden, the city electrical engineer. Referring to the E.D.A. booklet on the subject, Mr. Honey said that if the principles outlined therein were closely followed it would do much to counteract the present trend in which numerous water heating appliances were installed regardless of the efficiency achieved. Although equipment and fuel might continue to be short during the next few years, no time should be lost in getting acquainted with the details of correct installation technique.

CORRESPONDENCE

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for correspondents' opinions.

Dangerous Installations

AMONG those responsible for dangerous installations is the contractor who wires a few plugs or an immersion heater, thrusts the ends into an existing main switch, or taps in on the meter tails, and leaves the job without notifying the supply authority. This is eventually discovered but possibly there are fresh consumers in the premises, and they know nothing about the installation, so nothing is ever found out.

Until it is made an offence to do this kind of work, it will go on. Again, each supply authority has its own regulations and an electrician working in areas supplied by more than one authority must know all these regulations so that he can meet all requirements. There should be one set of rules for all areas, which would, I think, simplify matters considerably.

Horsebridge, Sussex. G. J. NICHOLLS.

DANGEROUS installations are not always the fault of contractors or handy householders. When trying to buy a small radio set to give to a child as a birthday present the other day, I was astonished to receive a hearty shock while tuning in to a station. I was standing on a dry stone floor, with very dry hands and stout shoes yet the shock was quite considerable. When this was pointed out to the sales assistant she merely remarked: "Oh! that's all right, the chassis is live; all modern sets are, they must be to work properly. All it wants is for the screw in the knob to be screwed in a little further."

It seems to me that it should be a criminal offence to sell, or make, apparatus for use in homes, possibly by children, that "only want a screw or so to be screwed in further to be safe." W. D. M.

Reducing Maximum Demand

THOSE of your readers who are concerned with the problem of reducing kVA maximum demand might be interested in some tests I made recently on fractional-h.p. motors. The no-load figures are particularly notable since it is well known that such small machines "idle" for a very large proportion of their running time on machine loads. Test capacitors were available giving 7½, 15, 20, 27½, 35, 40, 47½ and 55 μF by various combinations.

One motor was a split-phase induction-start 220/230-V, ¼-h.p., single-phase, 50-cycle 1,425-r.p.m. machine, which was direct-coupled to small vacuum pump compressor. The figures obtained were as follows:—

Condenser μF	*Motor amps unloaded*	*Motor amps loaded*
0	1·8	2·4
7½	1·6	2·25
15	1·25	2·1
20	1·1	2·1
27½	1·15	2·05
35	1·4	2·2
40	1·95	2·6
47½	2·2	2·7
55	2·6	3·05

A second motor was a repulsion-induction machine of ¼ h.p. at 100 or 200 V, 4·8/2·4 A, 50 cycles at 1,460 r.p.m. No load was connected, which gave the following results:

Condenser μF	*Motor amps unloaded*
0	2·4
7½	2·15
15	1·6
20	1·0
27½	·8
35	·7
40	1·3
47½	1·5
55	1·9

The capacitors were shunted across the line terminals of the motors.

The reduction in motor loading in kVA was in the first case, with 20 μF, 38·8 per cent when running light and 13·7 per cent when running loaded and in the second case, with 35 μF, 70 per cent. BCM/KILOVAR

Certifying D.C. Meters

A LARGE number of undertakings operating d.c. systems are having trouble in getting house-service meters certified owing to the difficulty in obtaining accuracy within the statutory limits throughout their range. This results in meters being stripped sometimes two or three times to get a 2 per cent improvement, often without success, and in large numbers of rejected meters lying idle when they are quite capable of giving reasonable service.

I suggest that, as a large and increasing number of consumers are on a combined

tariff, and pay ½d. to 1d. as a unit charge, the extreme accuracy called for is unnecessary and the futile occupation of trying to attain it is wasting many thousands of man-hours at a time when we cannot afford it.

This also results in the purchase at inflated prices of new d.c. meters, which will probably largely be obsolete in five or six years, just at the time when an increasing number of serviceable meters are coming on the market from change-over schemes.

If some tolerance were allowed in the accuracy requirements of the old d.c. meters, much unnecessary expense would be saved to the consumer, who pays in the end.

I should like to know the opinion of others who are interested, not in the meter industry, but in service to the consumer.

" URBAN."

Peak Load Control

TO an electricity undertaking having centralized control for superimposing signals on its distribution network, the use of the system for peak load control is attractive. The transmitting equipment is already installed, the spare signalling channels are ready for use and it only remains for receiving relays to be purchased and installed at the load.

A simple tuned buzzer on each consumer's installation, as recently suggested, appears to be too costly for a result likely to be far short of that aimed at, as the onus still rests on the consumer to switch off the water heater or the like. The simple tuned buzzer would cost as much as a tuned relay with load switch, which would cut off the load on receipt of the signal. Load-switching relays seem preferable for practical results, but delivery of the many thousands required could not be made before next winter at the earliest. Each undertaking would need large quantities and the outlay at £4 to £5 each would be no mean sum.

The average consumer would need to be assured that, for the inconvenience caused, his price per kWh for that particular circuit would be somewhat reduced. The undertaking would need to expend say £2 5s. on an additional meter per installation, plus fixing charges for relay and meter and increased costs for meter reading and accountancy.

In spite of the reliability of control systems now on the market, none is absolutely fault-proof. Assuming 99 per cent reliability, the odd ten faulty relays per 1,000 would be a further cost. If a relay fails to switch on the load (such as a water heater normally in constant use) at the end of the restricted period, the consumer would require immediate attention. In a large supply area a few faulty relays would cause maintenance departments hitherto unknown " headaches." Also, the relays, being intrinsically delicate, require specially careful handling.

For flexibility of control these systems cannot be beaten; the signal need only be transmitted at those times on those days when load cutting is imminent. In systems relying on frequency control the transmitter must operate efficiently irrespective of normal mains frequency, because that may be low just when a signal is sent out.

Load factor should be improved, the undertaking's maximum demand on which it pays should be reduced, and load-cutting periods should generally be reduced, but consideration ought to be given to the possibility, with any large-scale control, of the same load causing another peak period when it is all reconnected to the supply system. It will be a larger load (if water heaters are thermostatically controlled) than it was when disconnected.

Such pros and cons should be closely investigated, and a detailed analysis of any such system already in operation would be welcomed by the supply industry as a guide to future policy in overcoming the shortage of generating plant.

Bedford. S. A. DAINES, A.M.I.E.E.

Repairing a Switch

THE plastic knobs on the end of my electric light switches have been breaking off recently and my fingers have become quite sore pressing the screw piece that was left. Hunting through an old bead box, I found some wooden beads the same size as the broken knobs. After enlarging the holes slightly at one end I screwed the beads to the remains of the switches and then painted them brown to match the rest of the fittings. The result is very successful and the beads are far stronger than the original knobs.

Reading. EVELYN TERRY.

Public Transport Conference

The Public Transport Association is to hold its annual conference at Eastbourne from 4th to 6th May. In addition to the annual meeting and annual dinner or special buffet and dance, arrangements are being made for the reading and discussion of two papers.

Building Centre

AT the Building Centre in Bond Street before the war, architects, builders and the public could obtain information on everything to do with the supply of materials and equipment for building. During the war these premises were destroyed, and so were the Grafton Galleries to which it moved. During the latter part of the war the Centre moved to its present premises at 9, Conduit Street, W.1, which were originally occupied by the Royal Institute of British Architects. These were only partially destroyed. Full reconstruction of the building has just been completed, and last week we attended a Press view to see what has been done in the re-establishment of the Centre.

Generally, the display of building materials is very complete, although, as Mr. F. R. Yerbury (managing director) pointed out, much is only available for export at the moment. The value of showing such materials, however, lies in acquainting students of architecture with the materials which were available before the war and which will again be obtainable in the future. Many of the materials now in use are of a temporary nature. With such an excellent display of gas and solid fuel appliances, it was rather disappointing to note during our visit that the electrical section is at the moment almost bare, and it is to be hoped that this section will be completed in the near future.

Economy Playlets

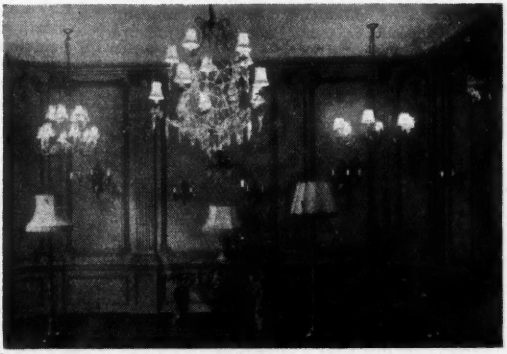
EXHORTATIONS to economize in fuel have become so numerous that the general public and the housewife in particular, to whom most of them are addressed, have to some extent lost interest. At the headquarters of the Electrical Association for Women, 35, Grosvenor Place, London, S.W.1, last week we witnessed two playlets which not only give practical information to housewives on such matters as meter reading, economy in cooking and the use of domestic apparatus, but cleverly sugar the pill with touches of humour.

"Target without Tears," by Eleanor Elmitt Edwards, opens with a conversation on fuel economy between two housewives, followed by humorous interludes in which a mistress endeavours to instruct a domestic help in the economical use of electricity, and an imaginary conversation between two women in a fish queue. The other playlet "The Lady who Cooked by Instinct," by Cynthia Hutt and Eleanor Elmitt Edwards, demonstrates in a humorous way electrical cooking economy by showing "Mrs. Right" and "Mrs. Wrong" both cooking in the same kitchen. The two plays were acted by Mabel G. Reading, Eleanor Elmitt Edwards and Cynthia Hutt who successfully "put across" the message of economy. "Props" are of the simplest and can easily be home-made. The plays have already been given at E.A.W. branches and other women's organizations in Southern England, and the Association has now printed them in booklet form. Copies of this booklet can be obtained from the Association at 1s. each.

New Lighting Showrooms

FOR many years at Farringdon Road, Falk, Stadelmann & Co., Ltd., have now opened impressive showroom premises in the heart of Mayfair at 20-22, Mount Street, Grosvenor Square, London, W.C.1. The showrooms in Farringdon Road were destroyed by enemy action, although the head office is still there.

The new showrooms, which have been opened to cope more fully with the export drive, have large display windows and an imposing entrance with a period reception hall. Many of the electric lighting fittings displayed are period fittings of beautiful workmanship, and are at the moment mostly for export. In contrast with these there are examples of modern illumination. Architectural lighting plays an important part of the display. One of the central positions of the showrooms has a laylight with tinted "Perspex" panels illuminated by ten 40-W fluorescent lamps. The rear section of the showrooms is indirectly lighted by means of cold cathode fluorescent tubes, concealed in a plaster cornice. The entrance hall has an edge-lit decorated glass panel with ¼-in. thick plate glass decorated with a cut and edged design. This is illuminated with cold cathode fluorescent tubing, concealed round the edge of the panel. Three examples of advanced design in decorated fluorescent fittings are shown—a louvred model with fluted glazed side panels, sand blasted reeded glass panels and a



Reception hall of Falk, Stadelmann's West End showrooms

translucent plastic oval diffusing enclosure. The ground floor has examples of industrial and general commercial lighting fittings. Aajoining the showrooms is a wholesale trade counter and warehouse.

Mr. G. Falk, chairman of the company, welcomed members of the Press at a pre-view last week and paid tribute to the work of Mr. W. C. Jeary, the sales manager who has been responsible for the work of establishing the showrooms.

Ship Supplies in Harbour

IN Ramsgate harbour is moored against one of the quays a three-masted barque called *The Bounty*. While retaining the atmosphere of the days of sail, it has been converted into a first class showboat and restaurant. There are various other attractions aboard including "Captain Bligh's Cabin" and dancing. The ship is lighted throughout by electricity and the connection is made by heavy flexible cable from the ship to the Ramsgate & District Electric Supply Co.'s mains under the roadway along the quay. The food is prepared in an electric kitchen with a total loading of 50 kW, the equipment for which was manufactured by the Jackson Electric Stove Co., Ltd., and installed by the Ramsgate Co. under the supervision of the local manager and engineer, Mr. E. Lewis. During the war Mr. Lewis co-operated with the Admiralty and points were run to all berths to enable the Navy coastal craft and other H.M. ships to have a shore supply.

Sheffield and Area Board

THE reason Sheffield is not represented on the Yorkshire Electricity Board, asserted Councillor Holland, chairman of the Electricity Committee, at a meeting of the Sheffield City Council, was that it was on the "black list" of the Incorporated Municipal Electrical Association, the body which advised the Minister of Fuel and Power concerning appointments. He said that Sheffield had for some years been blacklisted for not paying the scale of salaries advanced by the electrical engineers. The scale was rejected on the advice of the Association of Municipal Corporations. The city had been boycotted to the extent of having no representative on any committee of the I.M.E.A. and their manager had been denied the right of serving on any advisory committee. He contended that the attitude of the I.M.E.A. was that of the closed shop pushed to the farthest possible extreme. Alderman H. W. Jackson held that the Ministry had shown deliberate and definite obstruction and discourtesy to Sheffield. A resolution was adopted informing the Minister that the best interests of the city could only be secured by direct representation on the Board.

Mr. J. W. Simpson, secretary of the I.M.E.A., following the meeting of the City Council, stated that his Association had no responsibility for Sheffield's non-representation on the Yorkshire Board, and denied that Sheffield had been blacklisted for failure to adopt the Walker salary scale for electrical engineers. His Association had not been consulted by the Ministry of Fuel and Power on the appointment of B.E.A. members or of Area Boards. A further denial of blacklisting was made at the annual dinner last Friday of the Sheffield branch of the Electrical Contractors' Association by Mr. A. P. McAllister, secretary of the Associated Municipal Electrical Engineers. It was stated by another speaker that Sheffield was to be the headquarters of one of seven sub-areas to be set up under the Yorkshire Board. The No. 3 area would include Sheffield, Rotherham, and Mexborough, and Mr. J. R. Struthers, chief engineer and manager of the Sheffield Corporation undertaking, had been appointed sub-area general manager.

Ripple Control

BASIC requirements for imposing ripple control upon a known power distribution network are described in a paper prepared by MESSRS. T. W. ROSS and R. M. A. SMITH (Metropolitan-Vickers Electrical Co., Ltd.) for the I.E.E. Transmission Section.

A method is described of network analysis for predetermining the ripple power needed to furnish an actuating signal of the desired strength and of evaluating its degree of uniformity. Modern circuits and methods of connecting them to the power network have improved the injection efficiency appreciably, correspondingly reducing the size of plant required. The trend is said to be towards the use of a single ripple frequency as a "carrier" for each supply area with some form of coding for discriminating between separate control channels. The principles of various forms of coding and of receiving relays to respond to such codes are discussed.

The authors assert that ripple control can be applied to power supply networks with satisfactory results and, they suggest, with decided economic advantages. The fact that so many networks are interconnected in the United Kingdom will necessitate the provision of an increasing number of signal channels. The present practical limitations in this respect are clearly defined, so that users should restrict this form of control to those purposes for which it is needed most and also refrain from specifying more channels than will actually be needed. Each equipment can conveniently cater for twelve separate signals which the authors anticipate will be ample for any one network.

Turning to the economics of the subject, the authors suggest that the most profitable use to which centralized ripple control can be put is perhaps the regulation of off-peak loads, particularly domestic water heating. Approximate installation costs in terms of system maximum demand are indicated in the last section of this paper.

COMMERCE and INDUSTRY

E.D.A. Annual Luncheon. Conditions under State Control.

LORD CITRINE, chairman of the British Electricity Authority, will be the principal guest at the annual luncheon of the British Electrical Development Association at the Connaught Rooms, London, W.C.2, on March 19th. As usual, the annual meeting will follow the luncheon.

State-controlled Industries

Some views on the Government's policy towards the industries which it has nationalized were expressed by Mr. Herbert Morrison, Lord President of the Council, on Sunday last. It was the aim, he said, to improve service to the public, raise efficiency and ensure the dignity and well-being of the workers. He maintained that the taking-over of electricity supply would result in the provision of cheap electricity to rural areas, a matter which, " with one or two honourable exceptions," the supply companies were unwilling to undertake. They would try to maintain the necessary element of healthy emulation between gas and electricity.

Dealing with the contention that there was a tendency towards over-staffed and expensive boards, Mr. Morrison said that people should not believe all that was said on this matter, but it was necessary to keep down overhead charges as much as possible. Accusations of complacency and extravagant inefficiency on the part of public boards were wildly exaggerated. Critics were silent about similar faults in large-scale private concerns, but there was certainly a danger to be watched.

"Staggering" of Hours

At a meeting on 4th February of the National Joint Advisory Council, representing the British Employers' Confederation and the Trades Union Congress, the Council was informed that the Electricity Sub-Committee had considered whether the time had arrived when it could make a recommendation as to the date on which the " staggering " of hours of work could be relaxed for the summer months. The Sub-Committee was firmly of the opinion that staggering would be absolutely necessary in the winter months, but it considered that the arrangement might well be relaxed as soon as possible for the duration of the summer. It suggested that Regional Boards for Industry should be informed at once that they were authorized to proceed on the assumption that there would be relaxation as from a specified date, so that they could prepare to suspend the special staggering arrangements from that date until October. A full discussion took place and the views expressed will be considered by the Government.

L.C.C. School Lighting

A number of gas-lighted schools in London are to be equipped with electric lighting where the present method is inadequate. The L.C.C. Education Committee reported to the Council on Tuesday that the work at many schools is well in hand but the shortage of steel has prevented the use of conduit except in special circumstances. A mineral-insulated cable is being used instead and the makers could supply it more expeditiously and at a financial advantage to the Council if a bulk order were placed for the cable required. The Committee recommended that this should be done.

Chichester Fuel Economy

In conjunction with the Bognor & District Gas & Electricity Co., the Chichester City Electricity Department recently held a fuel saving exhibition and film display in the Assembly Rooms, Chichester. The regional publicity officer of the Ministry of Fuel and Power assisted with the provision of some of the exhibits. The exhibition consisted of nine major set-pieces, depicting the need to save gas and electricity, and these were supported by film shows which were held at intervals during

Display at the Chichester Fuel Saving Exhibition

the morning, afternoon and evening. A feature of the exhibition was the interest taken by the local schools, which sent fourteen organized parties, totalling 550 pupils. Competitions were held for the best fuel-saving hint, and for guessing the weight of a bag of coal.

Manchester Electrical Contractors

The Manchester Branch of the Electrical Contractors' Association held its annual Ladies' Evening on Saturday last at the Midland Hotel. A full programme included afternoon whist, followed by a dinner and dance. After dinner, Mr. F. J. Erroll, M.P., proposed the toast of "The Electrical Contractors' Association." He referred to the importance of using electrical appliances intelligently, and said that ladies were often serious offenders. But there were men who did their own installation work instead of employing good electrical contractors with dire results.

Mr. Erroll warned contractors that the British Electricity Authority was preparing "all-embracing plans to put the honest con-contractor out of business" by encouraging the establishment of installation departments in all towns. He believed that all manner of inducements would be showered on the housewife to persuade her to give up the reliable service of the local electrical contractor and accept a State-monopoly house-wiring service. There would also be a great extension of retail trading in electrical goods and appliances by the Authority to the detriment of local traders.

Mr. L. C. Penwill, director of the Association replied. Mr. J. R. Halliwell proposed the toast of the chairman, Mr. W. H. Smith, O.B.E., who responded.

Worthing Street-Lighting Employees

The Finance and Law Committee of Worthing Town Council recently decided to inform the Electrical Trades Union that the Corporation is not prepared to adopt a 44-hour week for members of the union employed in the Street-Lighting Department. The town clerk had explained that the men were not employees of the Electricity Department, but the rate of pay laid down by the District Joint Council for the Electricity Supply Industry for similar work had been adopted for them. The Committee further resolved to ask the Association of Municipal Corporations to consider the desirability of pressing for a reduction in the number of unions and joint councils which represent different classes of Corporation employees.

Employment in November

A further increase in the number of insured persons employed in electrical engineering, wiring and contracting, and the manufacture of electrical apparatus, cables, lamps, etc., occurred in November. In the first of the three groups, the *Ministry of Labour Gazette* shows that the number employed was 158,600 (50,600 women) compared with 157,400 (50,300 women) in October and 133,900 (28,000 women) in mid-1939. In the second group the November total was 59,700 (5,900 women) against 58,800 (5,700 women) in October and 41,700 (2,800 women) in mid-1939. In the third group 287,600 (138,700 women) were employed in November compared with 285,400 (137,800 women) in October and 195,900 (79,500 women) in mid-1939.

At 8th December there were 1,691 persons (550 women) unemployed in the electrical engineering industry in Great Britain; in electrical wiring and contracting 715 (48 women); and in electrical apparatus, cables, lamps, etc., manufacture, 2,794 (1,226 women). The electrical engineering total is the same as a month before, while there was a reduction in the other groups.

Stud Welding Demonstration

Cooke & Ferguson, Ltd., gave a demonstration of the Nelson stud welding equipment to over eighty firms on 5th February at the Manchester Corporation Electricity showrooms. Mr. C. C. Henderson spoke on the design and operation of the Nelson stud welding gun and its ancillary equipment. A colour film was then shown illustraing the applications of this equipment in the United States on a wide range of products. The Nelson unit was shown engaged on deck planking in the shipbuilding industry and another method shown of saving time and money was in the erection of steel buildings using sheeting by the Nelson "all topside" technique. Further applications were shown incorporating the Nelson gun in a production unit which showed the gun mounted in a small horse-shoe fabricated steel frame raised and lowered by a small hydraulic cylinder.

After the film the ease with which this new welding tool can be used was demonstrated. Finally, two Nelson stud welding units were used for the actual practical work, and many engineers took advantage of the opportunity of welding Nelson studs up to ½ in. diameter in times varying up to half a second. It is considered that stud welding operators can be trained to produce first-class stud welds by the Nelson gun methods in four hours.

"Practical Electrician's Pocket Book"

The electrician is nowadays called on to install and maintain many items employing electronic valves, and in its jubilee edition "The Practical Electrician's Pocket Book, 1948," provides timely guidance on all these devices. Information is also given on the installation and maintenance of wiring systems, lighting (including fluorescent tubular lamps), motors and motor control gear. Synchronous and impulse clocks are the subject of a new chapter and other sections deal with testing, measurement, regulations, tariffs, space heating, water heating,

refrigeration, ventilation, horticulture, catering equipment, cinema equipment, electric tools and interference suppression. As in previous editions there is a table of electricity supply voltages of the United Kingdom. The Pocket Book is published by *Electrical and Radio Trading* (Odhams Press, Ltd.), at 4s. 10d. post free, and can be obtained from 6, Catherine Street, London, W.C.2.

Radiolympia, 1949

The Radio Industry Council is planning to hold the next National Radio Exhibition in the autumn of 1949 and is discussing arrangements with the management of Olympia. It is stated that this date has been chosen in preference to a date in 1948 to enable the industry as a whole to concentrate on production for its export target and to allow the manufacturers of radio and television receivers more time for the development and production of new sets.

Electrical Legislation

Owing to the great demand " The Electricity Supply Statutes, as adapted and modified by the Electricity Act, 1947," published at 10s. in August last by the London and Home Counties J.E.A., 5-6, Lancaster Place, Strand, W.C.2, and the index to electrical legislation published in November (5s.) are now out of print. Mr. A. L. Burnell, clerk to the Authority, informs us that it has been decided to reprint these publications if sufficient orders are obtained and he suggests that those who require copies should notify him immediately.

Power for Aqueduct Construction

Associated British Oil Engines, Ltd., has received an order for four Petter-Brush diesel-electric generating sets from the Cementation Co., Ltd., Doncaster, the contractors for the construction of the 10-mile (16-km) Bowland Forest tunnel, part of the Haweswater aqueduct to supply Manchester with water. These sets, which are required to provide power and light for the constructional work, comprise three Petter " SS3 " super-scavenge three-cylinder, two-stroke vertical diesel engines coupled to Brush 200-kW alternators, and one Petter " SS2 " two-cylinder engine coupled to a Brush 134-kW alternator. Arrangements will be made for the waste heat from these engines to be used for heating the buildings which are being erected to house the men engaged on the work.

Brook Motors Film

A film entitled " Distinguished Company " has been made by Brook Motors, Ltd., primarily to give customers at home and abroad an action picture of the company's works. The film is just sufficiently technical to provide information to those who require it, without sacrificing the more general interest. The film introduces Michael Faraday, who appears in the dream of a works manager. A tour of the factories, in which the audience joins the inquiring and marvelling Faraday and his guide, covers the logical pattern of production flow from the building of a fractional-horse-power motor to the largest industrial types. The film lasts forty minutes and gives an overall picture of a.c. motor construction by up-to-date methods. After a premiere at the Ritz Cinema, Huddersfield, on 14th February, to which all Brook employees have been invited, the film will be released in 16-mm copies for showing to societies and other organizations. Twelve copies of the film will be circulated to Brook Motors representatives throughout the world.

Reports on German Industry

Among reports on German industry obtainable from H.M. Stationery Office are F.I.A.T. 1119, " Methods of Transmitting 2,000,000 kW of Electric Power 600 km " (2s. 6d.); F.I.A.T. 1129, " German Practice in Fabrication of Gas Turbine Blades " (2s.); and B.I.O.S. Misc. 57, " Servos with Magnetic Amplifiers (Transductors) " (1s. 6d.).

Institutions Merge

General meetings of members of the Institutions of Factory Managers and Works Managers having agreed in principle to a proposed merger, it has now been decided to amalgamate the two Institutions as from 1st July next.

Public Speaking Competitions

The British Electrical Development Association is reviving its public speaking competitions in the South-East and East England Area. The competition for women is to be held next Tuesday, 17th February (7 p.m.) at Caxton Hall, Westminster, S.W.1, and that for men on 23rd February at the Lighting Service Bureau, 2, Savoy Hill, W.C.2. These competitions are open to anybody who may be interested.

Birkenhead Power Station

In the *Electrical Review* of 30th January, brief particulars were given to the projected power station of Birkenhead Corporation at Bromborough, Cheshire, the foundation stone of which was laid on 2nd February. Inlet steam temperature of the English Electric 50,000-kW turbines will be 900 deg F. (482 deg. C) and not as stated in the report.

Ship's Thermovent Installation

The new Rotterdam Lloyd liner M.V. *Willem Ruys* of 21,500 tons has just returned from her successful maiden voyage to Batavia. The vessel has 200 cabin Thermovent heating units, most of which were supplied by E. K. Cole, Ltd., in 1939 when the ship was under construction in Holland. During the German occupation the shipbuilders hid all the Thermovents, together with some other valuable items, underground. Though the Nazis pressed for completion of the ship, the hidden equipment

was never unearthed and the *Willem Ruys* did not get off the stocks until she was eventually completed after the liberation.

Instrument Handbook

The latest edition of the "S.I.M.A. Handbook" is nearly double the size of its two predecessors. The main feature of this valuable source of reference is an alphabetical index, with about 2,000 entries, to the products of member-firms of the Scientific Instrument Manufacturers' Association. The book is arranged to enable the names and addresses of the makers of particular kinds of instruments to be quickly found, while the ranges of products of individual firms are separately indicated. There is also an eight-page list of research organizations in this country as well as full information about the Association and the instrument making industry which it serves. The handbook is obtainable for 10s. 6d., post free, from the Association at 26, Russell Square, London, W C.1.

Railway Equipment for Brazil

Coinciding with the departure last Saturday of the British trade mission to Brazil, the first shipments left Britain of the £2 million contract secured by the English Electric Co. for electric railway traction equipment for the Estrada de Ferro Santos a Jundiai (formerly Sao Paulo Railway of Brazil). The contract comprises the complete electrification of 85 km of main line, including rolling stock. British Insulated Callender's Cables, Ltd., are associated with the contract for the supply of overhead transmission equipment.

Overseas Trade Film

The film entitled " Overseas Trade," reference to which was made in our issue of 28th November, may now be hired at a small charge from Sound-Services, Ltd., 269, Kingston Road, Merton, S.W.19. The subject matter of the film embraces the services offered by the banks in facilitating overseas trade.

Trade Announcements

Reynolds & Bradwell, Ltd., electrical engineers and contractors, are removing to 35-36, Carver Street, Birmingham, 1.

The Birmingham sales office of the **Northern Aluminium Co., Ltd.,** is now at 14, Temple Street, Birmingham, 2 (telephone: Midland 5236), and the South-Western area sales office has removed to 18, St. Augustine Parade, City Centre, Bristol, 1 (telephone: Bristol 20351).

Mr. E. N. Ford, 38, Shiphay Park Road, Shiphay, Torquay, has been appointed a representative in the West of England for **T. Handley & Co., Ltd.,** Leeds.

Mr. A. C. Marshall, London sales representative of the **Garrard Engineering & Manufacturing Co., Ltd.,** has now moved from the company's registered office in Grafton Street to new offices at 68-70, Finsbury Pavement, E.C. (telephone: Met 8927). The Service and Spares Department is now at Okus Road, Swindon (telephone: Swindon 3405).

A.B. Metal Products, Ltd., of Feltham, Middlesex, has taken over the assets, plant and goodwill of Electro-Plastics, Milton Street, Watford, manufacturers of domestic electrical fittings.

Trade Marks

THE following applications have been made for the registration of trade marks. Objections may be entered within a month from February 4th:—

BRITISH ARROW. No. 654,693, Class 7. Electric motors (other than electric motors for land vehicles) and washing machines. No. 654,694, Class 11. Refrigerators.—Arrow Aircraft, Ltd., The Aerodrome, Victoria Avenue, Yeadon, near Leeds.

DANFOSS. No. B651,963, Class 9. Electrical apparatus and appliances included in Class 9.—Mads Clausen, trading as Danfoss, Elsmark, pr. Nordberg, Als, Denmark. Address for service: c/o Wildbore & Gibbons, 101, Leadenhall Street, London, E.C.3.

TAPIR BRAND (design). No. 652,758, Class 9. Electric switches and parts thereof included in Class 9, etc.—Clifford McMullan & Co., Ltd., 36, Bedford Street, Belfast.

MICRO-MAC. No. 655,105, Class 9. Electric switches.—C. H. Parsons, Ltd., Britannia Works, Wharfedale Road, Tyseley, Birmingham.

ELECTROSAN. No. 653,175, Class 11. Sanitary installations and appliances and parts included in Class 11 of such goods.—Sanutrene, Ltd., Crown Works, 197, Lower Richmond Road, Richmond, Surrey.

AIROFIER. No. 653,414, Class 11. Electric heaters.—Kent Alloys, Ltd., Temple Manor Works, Commercial Road, Strood, Kent.

DULCI. No. 653,352, Class 11. Lamp stands, lamp fittings (not paper) included in Class 11 and parts of such goods included in Class 11.—The Dulci Co., Ltd., Dulci Works, 97-99, Villiers Road, Willesden, London, N.W.2.

Export Inquiries

WE have received the undermentioned inquiries from firms and individuals overseas who wish to secure agencies for British electrical equipment and appliances or to import them into their territories. We shall be glad to pass on to them replies received from readers, which should be addressed to the Editors, quoting the number given in parentheses. We cannot vouch for the standing of inquirers and manufacturers replying to them will no doubt require the usual references:—

Portugal.—Inquirers wish to act as agents for British makers of transformers, motors, rectifiers, control apparatus, cables and measuring instruments. (X.196.)

Export Prospects—II

Difficulties Confronting Manufacturers of Consumer Goods

LAST week we outlined the general conditions in which manufacturers find themselves in their task of expanding their exports. In this article we continue our survey with especial reference to the problems facing exporters of consumer goods.

Before the war it was always considered that the first essential to successful export business was a healthy home market and this is still true. The progressive scaling down of the licences now being granted for the production of domestic appliances in the home market has resulted in uneconomic production. One firm which made 30,000 fires a quarter before the war has now been granted a licence for only 2,000 a quarter and has had to stop production. It is difficult to see how manufacturers can adjust their organizations to carry on a business which is mainly export.

Prices and Competition

The question of cost also enters into the matter. The sellers' market, in which it is possible to sell practically anything at any price, is fast diminishing (though it is still possible to obtain higher prices for quick delivery) and the competition of other countries is already being felt. Even now some articles are being sold abroad at prices which are barely remunerative and are well below the current home prices. Export prices can only be reduced if there are substantial and paying home sales.

The position has now been reached when many electrical appliance manufacturers can produce the whole of their home market quota for a quarter in perhaps a week: actually we know that in several cases, rather than keep employees idle, enough goods have been produced to meet the present home market quota for years. The theory that goods made for home market over the quota can be diverted to export or that all productive capacity remaining after meeting home quotas can be absorbed by making goods for export does not always prove valid in practice. Many of the articles are not in demand or, if they are, other factors prevent their export.

While there appear to be prospects of a good market for capital equipment for some considerable time, the same does not apply to consumer goods, which include all domestic appliances. All countries are still engaged in establishing, rebuilding or expanding their industries and are anxious to obtain large quantities of electrical equipment required for production. The number of countries capable of making this highly specialized capital equipment is still very limited.

On the other hand most countries can nowadays make the simpler of the consumer goods and are thus meeting their own needs. The shortage of both fuel and generating plant capacity too is by no means confined to this country and other Governments are having to take steps to restrict the too-rapid expansion of the use of electricity consuming appliances.

These facts, coupled with the inconvertibility of sterling, have resulted in a very large number of countries imposing import restrictions, and if these restrictions continue to be made efforts to increase exports will be largely nullified. South Africa, Australia, Portugal and Eire are now practically the only countries which do not place restrictions on the import of domestic appliances and these are now nearing saturation point. Ultimately there will be an enormous scope for expansion in the Chinese market but this is too remote to affect the immediate urgent position. Though open markets, Canada and the United States are not buyers of most electrical appliances. Belgium, Turkey and Cyprus are good markets at present but are also well supplied and require import licences. In the case of all countries import licences are issued for too short a period, leaving the exporter in doubt as to whether his products will in fact be acceptable when they are ready for delivery.

Import Restrictions

All the following markets have a large potential demand but are, we believe, at present wholly or mainly closed by import restrictions:—Argentina, British East Africa, British West Africa, British West Indies, Burma, Ceylon, Egypt, Greece, Holland, Hong Kong, Iceland, India, Iraq, Iran, Malaya, New Zealand, Palestine, Pakistan, Sudan, Transjordan and Trinidad. It is vital to secure the re-opening of these markets as soon as possible. Even where there are no import restrictions trading conditions are often such that no sterling is available or

some guarantee of payment is desirable. The Government is fully aware of the seriousness of the position and has assured the Federation of British Industries that it is making every possible effort to mitigate or remove the restrictions, even if it means a considerable increase in bilateral trade agreements. It may well be that some manufacturers, in order to overcome prohibitive tariffs or competition will find the only solution in the establishment of local factories.

Another factor which is already beginning to have an affect on the overseas demand for consumer goods is the severe restriction, on account of low convertibility factor, of the quantity of electrical conduit that it is permitted to export. Obviously it is better to export products which require a higher degree of skill and specialization to make and which produce a higher return for the quantity of raw materials used and from the immediate aspect of obtaining foreign currency this arrangement may have something to be said for it. Naturally, however, it is no use trying to sell consumer goods if there are no installations for them to work on.

While the electrical industry recognizes the desirability of exporting more goods to hard currency areas, defined by Sir Stafford Cripps as the Western Hemisphere (excluding British, French and Dutch Colonies) Sweden, Switzerland and Portugal, it must be pointed out that taken as a whole these countries are practically self-sufficient in the manufacture of electrical products and in 1946 took only 4·3 per cent of our total electrical exports. Incidentally, as might be expected, it is the hard currency countries which are most insistent on quick deliveries. If there is to be an increase in exports to these countries care must be taken that it is not merely temporary and made at the expense of old-established long-term connections in Empire or foreign countries.

Periods of Delivery

Delivery dates now offered by Great Britain and its principal competitor, the United States are very similar ranging from "ex-stock" delivery for some domestic appliances to two or three years for the scarcer capital goods. Generally, shipping facilities have improved recently but it is still necessary for preference to be given to weight rather than volume. It is, for instance, easier to get shipping space for cookers than water heaters. One aspect of shipping, however, is still not satisfactory, namely, that the shipping companies' shortage of staff is resulting in delays in getting bills of lading, with the result that difficulties arise in securing payment.

Prices quoted by the United Kingdom and the United States are also at the moment fairly comparable though our exporters are at a disadvantage, on account of the unstable conditions, in not being able to quote firm prices for deliveries several months ahead and having to include adjustment clauses in their contracts. Unfortunately, however, there is a tendency on the part of the United States to cut prices in order to gain entry to the Dominion markets. If Great Britain does the same in order to break into South American markets now dominated by the United States, the position is likely to become chaotic.

Scope for All

For the next ten to fifteen years at least the world demand is likely to be far greater than any one country can meet, and it is to be hoped therefore that there will be more co-operation between our country and America in the matter of prices, not for the sake of making more profits but to secure adequate return on capital invested. Arrangements under the Geneva Agreement, though a step in the right direction, only touch the fringe of the problem.

So far as capital goods are concerned the standard designs developed for the British market are generally suitable for use in all parts of the world under widely differing climatic conditions. When it comes to consumer goods, however, individual preferences reveal themselves in different countries and our manufacturers are realizing that it is necessary to produce special designs to meet these demands. Not only is it necessary to attend to appearance but some countries, notably Australia, New Zealand, Canada and Scandinavia, also have strict installation standards which have to be observed. Many special export models of domestic appliances are in fact already on the market and many more are on their way.

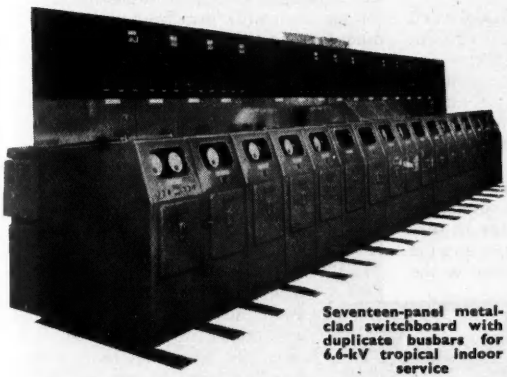
Great Britain's reputation as a supplier of electrical equipment has been built up very largely on high quality. Although immediately after the war a number of appliances of inferior quality made by less reputable firms did unfortunately find their way abroad, it is now realized that only the best is good enough if goods are to be exported and repeat orders obtained. In fact the "de luxe" quality goods are now almost entirely reserved for export.

Production for Export—I

All-Climate Switchgear

Special Laboratory Gives Extreme Conditions for Testing

AN entirely new type of switchgear developed by the Yorkshire Switchgear & Engineering Co., Ltd., particularly to cater for arduous climatic conditions, is now to be made available also for the home market. This is an interesting reversal of the usual practice of adapting home types for service abroad.

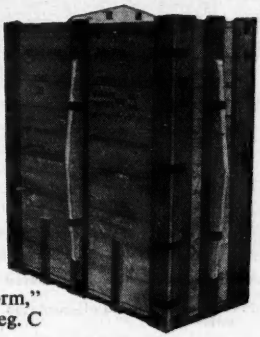


Seventeen-panel metal-clad switchboard with duplicate busbars for 6.6-kV tropical indoor service

As an initial and indispensable requirement in the development of this new technique of construction a special climatic laboratory has been provided which is probably unique in this country for the range of conditions it can reproduce. Temperatures of 55 deg C at 100 per cent relative humidity and 70 deg C at 5 per cent relative humidity are the most extreme conditions obtainable. To ensure that components are subjected to the greatest possible variations the maximum drop in temperature corresponding to the night temperature fall is synchronized with a "tropical storm," thus giving a drop in temperature of 40 deg. C in 15 minutes.

The humidifying equipment can be supplemented by bringing fine water sprays into operation to produce a highly penetrating atmosphere, equivalent to a jungle fog. The volume of water which falls into the laboratory during the tropical storm is about 75 gal. (341 litres) per minute, equivalent to 54 in. (137 cm) of rainfall per hour. The test room can be flooded and sea water and other corrosive conditions can be provided. A three-phase e.h.v. supply is available so that electrical components and complete assemblies may be subjected to their test voltage during the climatic tests.

The laboratory is divided into three main sections. The plant room containing the heating, humidifying and air circulating equipment is separated from the testing chamber by a heat insulated wall. Within the testing chamber are incoming and exhaust air ductings, storm water spray nozzles, and wet and dry mercury bulb thermometer elements connected by capilliary tubes to the adjacent instrument room. Two sets of double steel doors between the testing chamber and instrument room are interlocked to prevent their being simultaneously opened when a testing cycle is in progress.



Special "one way up" packing case

The control and recording equipment is mounted on a board of the company's own manufacture. Two sets of heaters (14 kW and 12 kW) are operated by the automatic controller through a series of pneumatically - operated switches on the control board. A series of cams fitted to the master controller and controlling the dry and wet bulb temperatures causes a greatly accelerated tropical climatic cycle to be produced within the testing chamber. Mounted below the controller is the recording

equipment with two recording pens operated from the wet and dry bulb elements.

Heaters are switched on or off according to the conditions required as determined by the difference in the angular displacements of the cam followers and the recording pen arms. A circular disc mounted on the controller cam spindle is fitted with two sets of operating catches which at predetermined time intervals bring into operation the storm or fog nozzles or cut out the humidifying equipment. This latter operation gives rise to the dry or desert heat cycle.

All the automatic controls are duplicated by hand controls, and the electrical changeover is made by selector switches. The scheme is also arranged for hand-automatic control so that the automatic cycle can be supplemented by hand operation for demonstration or any special testing duty. Interlocks protect the installation against failure of compressed air or electricity supply.

When commencing a testing cycle on electrical equipment, the apparatus is subjected to an insulation resistance test and the subsequent result is carefully referred to the prevailing relative humidity. The relevant e.h.v. pressure test is then applied and the apparatus is placed in the laboratory. Insulation resistance readings are taken at regular intervals and any signs of mechanical deterioration are recorded. During the development and operation of this laboratory invaluable data has been obtained in connection with the behaviour of the various insulating and other materials under tropical conditions. Extensive tests carried out on the anti-corrosive protection finishes employed gave results which were discouraging in many respects and new and original methods have had to be evolved to enable satisfactory products to be offered to meet increasingly exacting tropical conditions. The laboratory is available when not required for the company's own products, for testing other manufacturers' materials and apparatus.

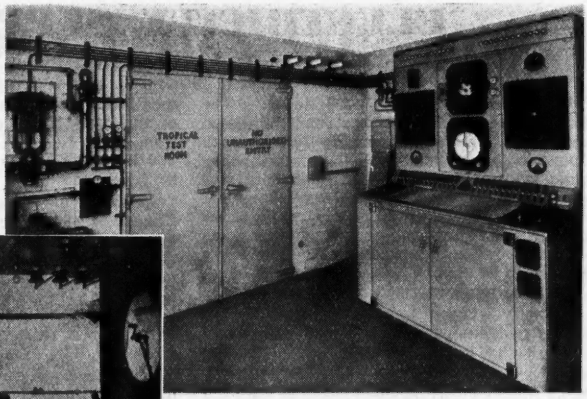
Left: L.v. 800-A, 25-MVA solenoid-operated air-insulated indoor type unit being assembled
Right: 11-kV, 400-A, 150-MVA hand-operated oil-insulated unit

Every component, including instruments, used in the new type of switchgear has been tested in the laboratory and the special features which have been incorporated as a result of these tests were outlined to us, during a recent visit to the company's Meanwood factory, by Mr. George Caton, managing director, who has been primarily responsible for the design. The exterior has been so designed as to ensure that water runs straight off without collecting at any point. The diving bell principle has been adopted for the design of the case which fits right over the apparatus (including the handle) from the top and can be easily removed entirely or propped half-open to give access to the interior. Water entering at the bottom can rise only a certain height owing to the compression of the air inside: there is nothing below the water level which can be damaged. Air spaces everywhere are as small as possible in order to minimize condensation. Though "Perspex" was tried for the inspection window, armour plated glass has been found preferable because the larger globules of water forming on condensation do not prevent the instruments from being read.

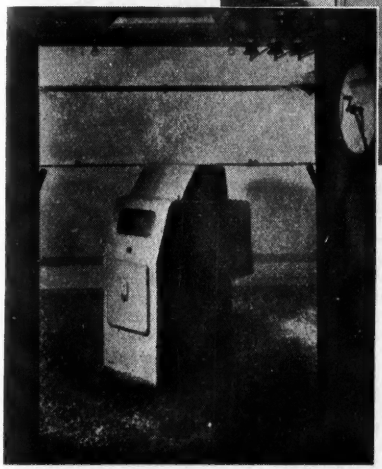
Paintwork is used solely as an additional protection or for decorative purposes. Although the outer covers are all of 97·7 per cent pure aluminium as many as four coats of paint are used in some cases, the final one being aluminium (which reflects but does not absorb heat to any extent) for outdoor gear and blue for indoor. The adoption of these attractive colourings is said by Mr.

Caton to have had a good effect on output.

Steel is eliminated whenever practicable, but where it must be used it is shot-blasted, metal sprayed and treated with a vitrified coating before painting. Practically every component is electroplated to guard against corrosion. Whenever possible all screws are of bronze and pins are of stainless steel.



Automatic control room of climatic testing laboratory



11-kV switchgear alive at 27 kV in climatic research chamber

All contacts are either solid silver or silver coated, while for the springs "Inconel," stainless steel or beryllium copper are used. Polythene mouldings have been adopted for terminal boxes and "Sindanyo" has proved its worth for insulating panels. Heavy porcelain insulators are used. The busbar and current transformer chambers are compound sealed and all light metal parts are enclosed either in oil or compound to prevent attack by vermin. To provide an adequate safety margin for operation under the most arduous conditions all the mechanisms are larger and heavier than usual. All cable and other components are treated with fungicide, and coils are embedded in mouldings of bituminous material.

To assist in securing the greatest possible production, which is now at the rate of about a hundred switches a month, a standard unit type of construction has been adopted both for outdoor and indoor service, utilizing the maximum number of standard parts. Models are available up to 2,000 A at 440 V and up to 2,000 A at 3, 11 or 15 kV, 250 MVA, either hand or solenoid operated. Duplicate busbar units with "On and Off" load are also available. Units intended for selection service abroad are made to a single design no matter for what part of the world they are intended. For the home market the overseas indoor type will be supplied for outdoor use, while indoor units will not necessarily be fitted with tropicalized instruments, etc.

Standard wiring harnesses are employed for all models and, though this frequently involves the provision of more wires than are necessary, it is felt worth while as it speeds up production. The gear may be mounted on skids to form portable substations.

Inverted vertical isolation gives full accessibility to the elevating mechanisms, trips, auxiliary switches, etc., when the door is opened. Automatic safety shutters prevent unauthorized operation when the plugs are withdrawn. With the cover and the tank nuts readily removable full access is available to the circuit breaker and it is claimed that a complete set of contact blocks can be renewed and aligned within five minutes. Many other such features, making for simple and speedy inspection and maintenance, are incorporated.

To ensure that the switchgear is not damaged during transport a special type of packing case has been constructed. It has curved batons on each side and on the top so that it cannot be placed the wrong way up.

ELECTRICITY SUPPLY

Finchley Scheme Deferred. York Farm Tariff.

Cheltenham. — COOKERS IN SCHOOLS. — The Council has decided that the small out-dated cookers at present on hire to schools with domestic science centres shall be replaced by large modern electric cookers which are now available. These will be lent free of charge.

ACQUISITION OF TRAILERS.—The action of the borough electrical engineer in obtaining ten unused two-wheel trailers from the Ministry of Supply, to be used by jointers in place of hand-carts, has been confirmed by the Council.

Coventry.—POWER STATION EMISSIONS. — The Coventry Planning and Redevelopment Committee has had under consideration the deleterious effects of condensation and the emision of dust, grit and fumes from the Longford power station and the possibility of a similar nuisance when the new station is erected. Low quality coal and the deterioration of the equipment at Longford, have been contributory factors, and it is thought that the new station, because of its efficiency, will not have bad effects. However, the Committee feels strongly that the nuisance should be abated at whatever cost.

INDUSTRIAL SUPPLY.—An additional supply of electricity is to be given to the works of Courtaulds, Ltd., and application is being made for sanction to a loan of £10,213 to cover the cost of the necessary equipment.

Finchley. — CENTRALIZED CONTROL. — The Electricity Commissioners have replied to the Council to the effect that they would not, on the information at present before them, be justified in approving the installation of new centralized control equipment for street lighting until the British Electricity Authority and the new Area Boards are in a position to consider the technical implications of any such scheme in relation to any proposals for unification of distribution systems.

Huddersfield.—POWER STATION EXTENSION.—The Town Council has approved a capital outlay of £1,489,800 on the extension of generating plant at St. Andrew's power station.

Nottingham.—SITE ACQUISITION.—The City Council has decided to appropriate about two acres of land at Basford, Nottingham, for electricity purposes. The site is required to accommodate the works and garage sections of the Electricity Department and also all the mains and meter stores. In addition it is intended to erect on part of the land a building to house 33-kV switchgear now on order.

South Shields.—HIGHER CHARGES.—For the year ending 31st March the electricity undertaking is expected to show a loss of £11,838. The Electricity Committee has approved a plan for raising electricity charges. Consumers on a quarterly basis will be subject to another 5 per cent increase (with the exception of those on tariffs with a coal clause). The running charge of the rateable value tariff will be increased from ¼d. to ⅝d. per kWh for consumption over 250 kWh. Prepayment meter tariffs are also being revised.

Spenborough.—HIRE-PURCHASE SCHEME.—The Council is to reintroduce the scheme for the hire-purchase of electrical apparatus. Appliances are to be supplied only for essential replacements, new dwellings, or premises converted into flats.

REPLACEMENT OF SWITCHGEAR.—Obsolete switchgear is to be replaced at an estimated cost of £5,511.

Stalybridge.—HIGHER DOMESTIC CHARGES.—The Stalybridge, Hyde, Mossley and Dukinfield Joint Transport and Electricity Board has applied for sanction to raise its charges for electricity supplies to domestic consumers. It was stated that in general domestic consumers would pay about 30 per cent more if the increases were approved. At present the Board's domestic tariffs were to all intents and purposes at the pre-war level, while industrial consumers had been subject to a coal clause adjustment.

York.—FARM TARIFF.—The Electricity Committee recommends that, in order to assist electrical development on farms, the Council should adopt the following "all-in" tariff for all purposes on the farm and in the farm house: Fixed charge, £12 per annum; "unit" charge ¼d. per kWh.

LOAD SHEDDING.—Arrangements have been made with the York Relay Service for the transmission of appeals for economy in the use of electricity during periods of high load to avoid load shedding, and announcements when the cutting off of supplies is about to take place.

SUBSTATIONS.—The Corporation is to replace a temporary small electricity substation in Eason View by a fully equipped substation at an estimated cost of £4,400. Application is being made for sanction to borrow £16,170 for the erection of a substation in Kingsway West.

Overseas

China.—YANGTSE VALLEY PLAN SUSPENDED.—Work has been suspended on the great Yangtse Valley Authority scheme owing to shortage of money. The plan, drawn up by Dr. John Savage, an American hydraulic engineer, would have ensured to centres along the Yangtse River, from Nanking to the remote wartime capital of Chungking, in Szechuan province, an ample supply of cheap electricity for industrial and other purposes. Dr. Wong Won-hao, chairman of the National Resources Commission, has made it clear that the project has only been "temporarily suspended," not abandoned.—*Reuter's Trade Service* (Shanghai).

FINANCIAL SECTION

Company News. Stock Exchange Activities.

Reports and Dividends

The English Electric Co., Ltd., in a preliminary statement reports a profit for the period from 1st January to 27th December, 1947, of £491,362, after meeting all losses attributable to the fuel crisis, and after providing for taxation and charging £245,135 for depreciation. This compares with £492,775 (after providing for taxation and £110,000 for depreciation) for 1946. A final ordinary dividend of 6 per cent, making 10 per cent, less tax, is recommended, the same rate as for the previous year.

Marconi's Wireless Telegraph Co., Ltd., reports a net profit for the period from 1st January to 27th December, 1947, of £162,671, as compared with £168,448 for 1946. The proposed ordinary dividend is 7 per cent, less tax (the same as for 1946).

The Marconi International Marine Communication Co., Ltd., in a preliminary statement, shows a net profit for 1947 of £90,264, as compared with £88,509 for the previous year. It is proposed to pay a final dividend of 5 per cent, maintaining the distribution for the year at 7½ per cent.

Sterling Electric Holdings, Ltd., has placed before holders of the £200,000 of £1 6½ per cent cumulative preference shares proposals for the funding of dividend arrears. The dividend has not been paid since September, 1938, and arrears to 30th September last amount to £117,000 gross or £64,350, less tax at 9s. It is proposed to satisfy arrears by distributing 4 per cent cumulative funding certificates for a nominal amount of £64,350, the net amount of the arrears. For the redemption of the certificates, the company will set aside annually out of profits available for ordinary dividends £2,500 plus 4 per cent on the nominal amount of the certificates previously withdrawn, the sums so set aside to be cumulative. On the group's present position the directors have reached the conclusion that profits henceforward should be more than sufficient to maintain the preference dividend.

International Combustion, Ltd., reports a net profit, before taxation, for the year ended 30th September last of £260,023 as compared with £233,767 for 1945-46. The ordinary dividend for the year is maintained at 37½ per cent, less tax, by a final dividend of 27½ per cent.

The Electrolux Corporation (of America) has announced an interim dividend of 40 cents per share (same).

Para Electric Railways & Lighting Co., Ltd.—It is reported that the Belem Municipality has expropriated the company's undertaking under the decree of "Caducidade" signed by the Brazilian authorities annulling the company's concession. The petition previously lodged by the company with the Supreme Court in Rio de Janeiro seeking annulment of the decree has not yet been heard.

Christy Bros. & Co., Ltd.—The Ministry of Fuel and Power has made an Order (S.I. 1948 No. 12) upon the company's application by which it is designated a holding company under the Electricity Act, 1947.

The Yorkshire Electric Power Co. reports a net profit for 1947, after payment of interest, of £1,137,771, as compared with £812,670 for 1946, which with £133,994 brought in, makes £1,271,765 available. As already announced, the final ordinary dividend is 6 per cent, maintaining the distribution for the year at 9 per cent. Depreciation and reserve receive £417,715, plant renewals fund £233,319, and A.R.P. expenditure written off £63,507. The balance carried forward is £339,097. Sales of electricity during the year totalled 927·9 million kWh (against 869·2 million kWh), and the maximum demand rose from 223,847 to 235,336 kW.

The London Electric Supply Corporation, Ltd., is paying a final ordinary dividend of 4 per cent, making 6 per cent for the year (unchanged).

Electricity Companies' Securities

The following companies have reached agreement with the Minister of Fuel and Power on the valuation of their securities which were not given a fixed value under the Electricity Act:—

London Power Co., Ltd.—Debenture stock: 5 per cent, £104 8s. 4d.; 4 per cent, £103 13s. 4d.; 3½ and 3¼ per cent, £103.

Metropolitan Electric Supply Co., Ltd.—3 per cent debenture stock, £100; £1 4½ per cent cumulative preference, 24s. 6d; £1 ordinary, 48s.

Notting Hill Electric Lighting Co., Ltd.—£10 6 per cent cumulative preference shares, £11 15s.; 5 per cent redeemable debenture stock, £104.

Egham & Staines Electricity Co., Ltd.—£1 7½ per cent cumulative preference shares, 33s. 9d.

New Companies

Electro-Horticultural Services, Ltd.—Registered 31st January. Capital, £1,000. Electrical and horticultural engineers, contractors for electrical and mechanical aids on farms, commercial growers' establishments, parks and gardens, etc. Directors: Alan Monkhouse and B. G. J. French. Regd. office: 86, Temple Chambers, E.C.4.

Hurcomb & Skinner, Ltd.—Registered 22nd January. Capital, £6,500. To acquire the business of an electrical engineer carried on by E. W. Hurcomb as Hurcomb & Co., at 76, Forest Lane, Stratford, E., and also the similar

business carried on by E. W. Hurcomb and H. F. B. Skinner as Hurcomb & Skinner at the same address. Directors: E. W. Hurcomb and H. F. B. Skinner. Regd. office: 76, Forest Lane, Stratford, E.

Leonard M. Ashborn, Ltd.—Registered 28th January. Capital, £1,000. Electrical engineers and general electrical installation contractors, etc. Directors: L. M. Ashborn and W. Ashborn. Regd. office: 391, Ewell Road, Tolworth, Surbiton, Surrey.

Electraire Productions, Ltd.—Registered 22nd January. Capital, £10,000. Electrical contractors, manufacturers of, and dealers in, all kinds of electrical goods and equipment, refrigerators, etc. Subscribers: J. R. Jones and A. Humby. Regd. office: 95, Checketts Road, Leicester.

Control Components, Ltd.—Registered 29th January. Capital, £1,000. Manufacturers of and dealers in, fluorescent lighting fittings and components, control gear, switches, etc. Directors: L. C. Burrow, L. J. Ingram, and N. A. Mears. Regd. office: 146, Upper Richmon Road, Putney, S.W.15.

Haden Electrical, Ltd.—Private company. Registered 8th January. Capital, £100. To acquire the electrical section of the business of engineers now carried on by G. N. Haden & Sons, Ltd., London. Subscribers: E. S. Sandilands and P. A. Smith. Regd. office: 19-29, Woburn Place, W.C.1.

Hunt & Wright, Ltd.—Registered 20th January. Capital, £600. Designers, manufacturers, importers and exporters of, agents for, and dealers in, radio, television, telephone and electrical apparatus, etc. Directors: J. Dukes, S. Hunt and C. Wright. Regd. office: 85, Corporation Road, West Marsh, Grimsby.

H. F. Pollard (Shrewsbury), Ltd.—Registered 30th January. Capital, £3,000. To acquire the business of a radio, electrical and acoustical engineer carried on by H. F. Pollard at 23, Castle Street, Shrewsbury and elsewhere. Directors: H. F. Pollard and Mrs. N. Pollard. Regd. office: 14, Castle Street, Shrewsbury.

F. W. Robson & Co., Ltd.—Registered 19th January. Capital, £1,000. Electrical engineers, etc. Directors: C. Everett, F. W. J. Robson and P. T. Whitehead. Regd. office: 2, Clement's Inn, W.C.2.

Broderick & Gregory, Ltd.—Registered 23rd January. Capital, £500. Electrical, radio and television engineers, etc. Directors: W. Broderick and A. N. Gregory. Regd. office: 407, Ashton New Road, Bradford, Manchester.

Magdalen Engineering Co., Ltd.—Registered 13th January. Capital, £2,000. Electrical and mechanical engineers, etc. Solicitors: Theodore Goddard & Co., 5, New Court, W.C.2.

Multi-Broadcast (Kent), Ltd.—Registered 26th January. Capital, £35,000. To acquire and amalgamate the undertakings of Herne Bay Relay Services, Ltd., Faversham Relay Service, Ltd., and Sittingbourne Relay Service, Ltd. Directors: J. W. Field, F. E. Field and J. E. Ball. Solicitors: Hardman, Phillips & Mann, 10, Norfolk Street, W.C.2.

L. N. Dawson, Ltd.—Registered 2nd February. Capital, £5,000. To acquire the business of an electrical engineer and electrician carried on by L. N. Dawson at 347a, Soho Road, Birmingham, as L. N. Dawson & Co. Directors: L. N. Dawson and F. W. Dawson. Regd. office: 347a, Soho Road, Birmingham.

Axon Motor Rewinding Co., Ltd.—Registered 15th January. Capital, £1,000. Permanent directors: J. R. Axon and A. Bain (director of Vacuum Cleaners & Electrical Supplies, Ltd.). Regd. office: 543, Moseley Road, Birmingham.

Electro Motion, Ltd. — Registered 19th January. Capital, £1,000. Electrical contractors, dealers and engineers, etc. Subscribers: E. B. Leemann and N. W. Mee. Regd. office: 90a, Melton Road, Leicester.

Greenwood Electrical Services, Ltd.—Registered 20th January. Capital, £100. Directors: E. T. M. Stephens, M. Kaliczak and H. D. Pritchard. Regd. office: 54, King Street, Carmarthen.

Anglo-French Electric, Ltd.—Registered 28th January. Capital, £100. Manufacturers and repairers of dynamos, motors, armatures, magnetos, etc. Solicitors: Stone & Stone, 69, Moorgate, E.C.2.

Blazes Neon Sign Co., Ltd.—Registered 22nd January. Capital, £500. Directors: E. E. Field, A. G. Field and H. W. N. Burrus. Regd. office: 9, Belgrave Road, S.W.1.

Increase of Capital

Thorn Electrical Industries, Ltd.—Capital increased by £400,000, in 5 per cent second cumulative preference shares of £1, beyond the registered capital of £206,250.

Bankruptcies

J. A. Woolcock, wireless and electrical engineer, lately carrying on business and residing at Iridge Cottage, Hurst Green, Sussex, and also at John Cross, Mountfield, Robertsbridge, Sussex.—Trustee, Mr. A. E. Orbell, 6 & 7, Old Steine, Brighton, appointed 29th January, 1948.

A. E. Starr, lately carrying on business at 125, Commercial Street, Batley, and formerly at 2, Brewery Lane, Thornhill Lees, Dewsbury, electrical and radio engineer, under the style of Electronic Enterprises.—Trustee, Mr. G. F. Morris, Hallfield Chambers, 71, Manningham Lane, Bradford, Official Receiver, released 29th January, 1948.

Liquidation

Middleton Electric Co., Ltd.—Meetings of members and creditors on 4th March at 6 & 7, Old Steine, Brighton, to receive an account of the winding-up by the liquidator, Mr. A. E. Orbell.

STOCKS AND SHARES

THESE are early days for any Budget influence to affect Stock Exchange markets, but already the prophets are beginning to canvass possibilities in connection with the Government's financial intentions to be revealed in April. This is because of the publication of the White Paper of last week, warning both sides of industry that there must be no general increase in wage levels without corresponding rise in output. The immediate effect was to cause a general depression in the ordinary shares of commercial and industrial companies, while at the same time it served to strengthen the quotations for purely gilt-edged securities: British Transport 3 per cent stock, for example, rose from 96¾ to 97¼ within the course of a few days.

On top of the Government's warnings in respect of limitation of profits, increases in wages and other such controversial matters, there followed a sharp break in New York in base metals, grain, and other products. Although nowadays there is little London market in Americans, the effect of this slump made its influence felt throughout our own Stock Exchange and shook, fairly severely, the prices of industrial shares. A certain amount of selling has been taking place on behalf of nervous holders. Money realized by the sale of such shares has been going into British Government securities: hence their advance.

Changes on the Week

Anxiety with regard to future developments is the reason for weakness in Lancashire Dynamo 5¾, General Electric 90s. 6d., Tube Investments 6¼, Reyrolle 67s. 6d., Babcock & Wilcox 71s., and Westinghouse Brake 68s. 6d.

Electric Constructions, with an advance of half-a-crown to 55s., are noticeably firm. Brush, at 7s. 9d., are 9d. to the good. British Insulated have lost 1s. 6d. to 36s. 6d. The radio group is uneven, with E.M.I. unchanged at 19s., Deccas down to 36s. 3d. and Cossors to 16s. 6d. Losses of 1s. 3d. occurred in Falk Stadelmann 50s. and Hopkinsons 5⅜. Transport shares are quieter than of late, Tillings at 91s. 6d. are 1s. down; B.E.T. deferred at 1725, has lost 10 points. Activity in Cable & Wireless stocks favoured the ordinary rather than the preference. The latter has dropped 3 to 121½. Calcutta Electrics recovered 2s. 6d. to 42s. 6d.

English Electric

English Electric shares are 9d. easier at 54s. 3d. For many years, the dividend has been 10 per cent annually; last year's profit of £491,000 was about £2,000 lower than that in the previous twelve-month. English Electric controls Marconi's Wireless Telegraph, and upon the Ordinary shares in the latter the dividend of 7 per cent is to be repeated. Marconi's Wireless Telegraph Co. has a substantial interest in Marconi International Marine, which has declared a final dividend of 5 per cent, making 7½ per cent for the year, a rate which has been distributed for many years. Sir George H. Nelson is chairman of these three companies.

International Combustion shares hold their previous price at 50s. on repetition of the dividend, making 37½ per cent for the year, at which the yield on the money is £3 15s. per cent. The company's profit of £260,000 goes against last year's £234,000, in each case before taxation. The shares are amongst the "blue-chips" of the industrial market, with excellent profit and dividend record.

Globe Telegraph & Trust

At the date of the last balance sheet, in June, Globe Telegraph Trust's interest in Cable & Wireless (Holding) accounted for 40 per cent of the invested funds, at book cost, and for 60 per cent of the income. Electric lighting, gas and railway stocks represented a large proportion of the balance. Discussion of the Trust's future, after the nationalization of these principal interests, has suggested the desirability of an alteration in the articles, so as to give more latitude to the investment powers. An extraordinary meeting will be held on 25th February. Total investments are shown in the balance sheet at their cost value of £5,200,000. Excluding the cost of £1 million Cable Investment Trust ordinary stock, the remaining £4,100,000 had a market value in June of £7¾ millions. At 45s. 9d. the ordinary shares are 1s. lower on the week.

E. K. Cole Accounts

Earnings of the E. K. Cole group as a whole are shown by the accounts—which appear for the first time in consolidated form—to represent nearly 80 per cent gross on the parent company's ordinary capital. The raising of the dividend by 2½ to 22½ per cent involves therefore no departure from a highly conservative policy in that respect. The Ekco-Ensign subsidiary, which deals with the lighting side of the business, is shown to have contributed well to the expansion of the group's total profits. The 5s. shares at 20s. offer a yield of over 5½ per cent. The 7 per cent preferred ordinary, which again participate up to their maximum of a further 3 per cent, are offered at 30s. 6d., to yield £6 11s. 3d. per cent on the full 10 per cent payment.

Sterling Electric Holdings

Sterling Electric Holdings 6½ per cent preference shares, quoted a week ago at about 17s. 6d., have changed hands up to 21s. since the proposal for funding arrears of dividend which have accumulated since 1938 to a total of £64,350 net, after tax at 9s. An issue of 4 per cent Funding Certificates, to the nominal amount of that figure, is proposed in satisfaction of the arrears. So far as can be foreseen, profits should in future be more than sufficient, says the statement, to maintain the dividend.

Next Week's Events

Monday, 16th February

LIVERPOOL.—Royal Institution, Colquitt Street, 6.30 p.m. I.E.E. Mersey and North Wales Centre. "The Design of a High-Fidelity Disc Recording Equipment," by H. Davies.

LONDON.—St. Ermin's Hotel, Caxton Street, S.W.1, 6.40 p.m. Association of Supervising Electrical Engineers (Central London Branch). "Post Office Engineering during World War II," by A. C. Timmis.

MANCHESTER.—At the Geographical Society, 16, St. Mary's Parsonage, 7 p.m. Junior Institution of Engineers (North-Western Section). "Modern High-Pressure Steam Boilers," by G. Cooke.

NEWCASTLE-ON-TYNE.—King's College, 6.15 p.m. I.E.E. North-Eastern Radio and Measurements Group. "Speech Communications under Conditions of Deafness or Loud Noise," by Dr. W. G. Radley.

Tuesday, 17th February

LONDON.—Lighting Service Bureau, 2, Savoy Hill, W.C.2, 6.15 p.m. Association of Supervising Electrical Engineers. "Critical Temperature Control in Domestic and Industrial Processes," by F. E. Butcher.

MANCHESTER. — Engineers' Club, Albert Square, 6 p.m. I.E.E. North-Western Measurements Group. "Ultra-High-Speed Relays in the Fields of Measurement and Protection," by W. Casson and Dr. F. H. Last.

Wednesday, 18th February

COVENTRY.—Technical College, The Butts, 7 p.m. Association of Supervising Electrical Engineers (Coventry Branch). "High-Voltage Fluorescent Tubes."

EDINBURGH.—Heriot-Watt College, 6 p.m. I.E.E. Scottish Centre. "Some Observations on Oil Deterioration in Transformers and Switchgear," by H. Hurworth.

GLASGOW.—At the Institution of Engineers and Shipbuilders in Scotland, Elmbank Crescent, 6.45 p.m. British Institution of Radio Engineers (Scottish Section). "Supervisory Control," by L. G. Brough.

LONDON.—I.E.E. London Students' Section. Visit to B.I. Callender's Cables, Erith, Kent.

Connaught Rooms, Gt. Queen Street, W.C.2, 12.45 for 1.15 p.m. British Refrigeration Association. Annual luncheon.

MANCHESTER. — Engineers' Club, Albert Square, 7 p.m. Association of Supervising Electrical Engineers (Manchester Branch). "Electrode Boilers," by S. Lees.

NEWCASTLE-ON-TYNE.—At the Literary and Philosophical Society, 6.15 p.m. I.E.E. North-Eastern Centre. Faraday Lecture. "Electricity and Everyman," by Dr. P. Dunsheath.

SHEFFIELD.—Royal Victoria Station Hotel, 6.15 p.m. I.E.E. Sheffield Sub-Centre. "Survey of Metering Practice on the British Grid System," by F. Byrne.

Thursday, 19th February

DUBLIN.—Trinity College, 6 p.m. I.E.E. Irish Branch. "Propagation Problems in connection with Short-Wave Broadcasting," by W. Jones.

LONDON.—I.E.E., 5.30 p.m. "Design of Large Vertical-shaft Water-turbine-driven A.C. Generators." By E. M. Johnson and C. P. Holder.

Caxton Hall, Westminster, S.W.1, 2.30 p.m. Diesel Engine Users' Association. Informal discussion on operating problems.

MANCHESTER. — Engineers' Club, Albert Square, 7 p.m. E.P.E.A. (Northern Meter and Instruments (Technical Group). "Tele-Metering," by P. F. Gunning.

SOUTHSEA.—Kimbell's Restaurant, Osborne Road, 6.30 p.m. I.E.E. Southern Centre. Annual dinner and dance.

Friday, 20th February

BRISTOL.—Grand Hotel. Bristol Electric Club. "Hypnotism—Its Mysteries and Scientific Values," by A. Wilkins.

LONDON.—Storey's Gate, St. James's Park, S.W.1, 5.30 p.m. Joint meeting of the Institutions of Mechanical and Electrical Engineers. "Corrosion of Heating Surfaces in Boiler Plants," by J. R. Rylands and J. R. Jenkinson.

39, Victoria Street, S.W.1, 6.30 p.m. Junior Institution of Engineers. Informal meeting. "Ferranti and His Engine Designs," by W. E. Wyatt Millington.

Savoy Place, W.C.2, 5.30 p.m. I.E.E. Measurements Section. "Absolute Measurement of High Voltages by Oscillating Electrode Systems," by Dr. E. Bradshaw, S. A. Hussain, N. Kesavamurthy and K. B. Menon.

NEWCASTLE-ON-TYNE.—King's College, 7 p.m. I.E.E. North-Eastern Students' Section. "Some Aspects of Reactors," by D. Gordon.

Saturday, 21st February

LEEDS.—City Electricity Department, Whitehall Road, 2.30 p.m. I.E.E. North Midland Students' Section. "Some Notes on Insulating Oils," by K. K. Thane.

Combustion Appliance Makers' Association

THE Combustion Appliance Makers' Association is completing arrangements for a dance to be given to members and their guests at the Dorchester Hotel, London, on 18th March. The annual general meeting of the Association will be held on the afternoon of that day and the dance will take the place of the luncheon which followed it in former years. Tickets are available from the offices of the Association, 24, Tottenham Court Road, London, W.1, price 30s. each.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (1s. each) may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1941

A. V. E. C. Guilbert.—" Dynamo-electric generators." 4918. 12th April, 1940. (597149.)

1943

British Thomson-Houston Co., Ltd.—" Over-voltage protective devices for electric circuits." 7418. 9th May, 1942. (597208.) " Electric pressing irons." 9263. 9th June, 1942. (597209.)

Standard Telephones & Cables, Ltd., E. M. S. McWhirter and H. J. Ward.—" Electric selective signalling systems." 21613. 24th December, 1943. (597266.)

1944

A. T. Starr.—" Frequency control of resonant cavity oscillation generators." 4540. 10th March, 1944. (597212.)

Marconi's Wireless Telegraph Co., Ltd.—" Ultra-high-frequency tuning apparatus." 5935. 31st March, 1943. (597152.)

W. D. Allen.—" Ultra-high-frequency apparatus employing wave guides." 7368. 20th April, 1944. (597216.)

Westinghouse Electric International Co.—" Electrical protective systems." 12455. 26th August, 1942. (597155.) " Resinous electrically-insulating compositions and electrical apparatus impregnated therewith." 15860. 7th November, 1941. (597218.)

L. B. Mullett.—" Ultra-high-frequency apparatus." 13545. 14th July, 1944. (597217.)

General Electric Co., Ltd., and L. C. Jesty.—" Television of motion picture film." 13899. 20th July, 1944. (597395.)

Brush Development Co.—" Piezo-electric devices." 16142. 22nd March, 1943. (Addition to 575068.) (597397.)

Carlisle Electrical Manufacturing Co., Ltd., and A. Thorp.—" Textile fabrics." 16336. 28th August, 1944. (597330.)

English Electric Co., Ltd., R. L. English and E. H. H. Hassler.—" Electro-magnetic slip couplings." 17162. 8th September, 1944. (597399.)

Ever Ready Co. (Great Britain), Ltd., and F. Abel.—" Electro-chemical processes of producing manganese from aqueous-manganese salt solution." 17585. 14th September, 1944. (597220.)

Standard Telephones & Cables, Ltd.—" Dehydration of liquids by electrostatic heating." 25757. 4th March, 1944. (597403.)

1945

Standard Telephones & Cables, Ltd.—" High-frequency electromagnetic induction heating of limited areas." 39. 22nd March, 1944. (597161.) " Telephone systems." 995. 4th April, 1944. (597163.) " Selective filtering system for electric pulse trains." 21107. 24th May, 1943. (597323.)

Westinghouse Electric International Co.—" Electric relays." 1042. 12th January, 1944. (597164.) " Dynamo-electric machines." 10152. 28th January, 1943. (597411.)

H. Ward.—" Electric alarm clocks." 1880. 24th January, 1945. (Cognate applications 5747/45 and 10059/45.) (597166.)

A. R. Draffin.—" Electric water heaters of the storage type." 3502. 13th December, 1943. (597408.)

Farnsworth Television & Radio Corporation.—" Television scanning frequency generator." 3864. 18th November, 1943. (597234.)

W. Hirschhorn.—" Mounting of electrical switches, switch-socket-outlets, socket-outlets and like accessories on wall surfaces or the like." 4514. 22nd February, 1945. (597333.)

Elliott Bros. (London), Ltd., and H. D. Hawkes.—" Variable inductances, and electrical apparatus embodying the same." 7278. 22nd March, 1945. (597410.)

Philips Electrical, Ltd., and K. E. Latimer.—" Loud-speaking telephone arrangements." 8031. 29th March, 1945. (597170.)

J. B. Warren and W. D. Allen.—" Electromagnetic wave guides." 9848. 19th April, 1945. (597240.)

H. Butler, Ltd., and H. Butler.—" Electrical measuring instruments." 10756. 28th April, 1945. (597243.)

H. Smith, Ltd., and H. G. Smith.—" Tubular electric lamp fittings." 11957. 12th May, 1945. (597173.)

Sulzer Frères Soc. Anon.—" Gas turbine power plants." 12394. 19th May, 1944. (597337.)

Maschinenfabrik Oerlikon. —" Mercury vapour rectifiers of the single-anode type." 13732. 8th June, 1944. (597339.)

" Patelhold Patentverwertungs- & Elektro-Holding Akt.-Ges.—" Means for transmitting speech signals in which sub-division of the speech into components is used." 13829. 1st June, 1944. (597340.)

Submarine Signal Co.—"Piezo-electric oscillators." 14638. 8th July, 1940. (597421.)

Walsall Conduits, Ltd., and E. Gough.—" Electric tumbler switches." 14957. 13th June, 1945. (597341.)

W. D. Allen.—" Electro-magnetic wave-guides." 15789. 20th June, 1945. (597251.)

W. L. Stern.—" Automatically controlled

electric lighting systems." 16456. 24th June, 1946. (597274.)

British Thomson-Houston Co., Ltd.—"Methods of preparing alkylchloro polysiloxanes." 16509. 1st July, 1944. (597178.)

E. Pickup, G. E. Bacon and P. H. T. Brook.—"Electro-magnetic wave guide devices." 18070. 14th July, 1945. (597258.)

Philips Electrical, Ltd., J. A. M. Van Moll and C. R. Pye.—"Production of luminescent coating." 18270. 17th July, 1945. (597425.)

E. Shipton.—"Electric amplifiers, and deaf aids incorporating the same." 19010. 25th July, 1945. (597183.)

R. S. Webley.—"Electrical signal selecting circuits." 19710. 31st July, 1945. (597184.)

G. R. Shepherd (Westinghouse Electric International Co.).—"Systems for modulating ultra-high frequencies." 19892. 2nd August, 1945. (597260.)

F. C. Williams and A. I. Llewelyn.—"Scanning in radio echo systems." 20393. 8th August, 1945. (597429.)

F. E. J. Girling.—"Thermionic valve circuits." 20644. 10th August, 1945. (597185.)

W. W. Triggs (Farnsworth Television & Radio Corporation).—"Photo electric cell wiring electron multiplication." 20649 10th August, 1945. (597186.) "Thermionic valve frequency converters." 20650. 10th August, 1945. (597187.)

J. B. Tucker, J. E. Gaffney and H. Fawke.—"Electric switch and plug, and socket mechanisms." 20664. 11th August, 1945. (597190.)

O. L. Ratsey and C. S. Wright.—"Electrical differentiating circuits." 20692. 11th August, 1945. (597194.)

Telephone Manufacturing Co., Ltd., G. W. Barnes.—"Protective casings for electrical condensers or other electrical components." 20742. 13th August, 1945. (597288.)

General Electric Co., Ltd., and A. J. Biggs.—"Two-terminal electric oscillatory circuits having adjustable dynamic resistance." 20752. 13th August, 1945. (597430.)

General Electric Co., Ltd., and D. C. Espley.—"Electric signal transmission systems." 20754. 13th August, 1945. (597198.)

Nalder Bros. & Thompson, Ltd., L. W. G. Russell and C. R. Webb—"Relay apparatus for controlling electric power networks." 20780. 13th August, 1945. (597302.)

Dubilier Condenser Co. (1925), Ltd., Autotype Co., Ltd., P. R. Coursey and E. Rouse.—"Electrical condensers." 20841. 14th August, 1945. (597309.)

British Thomson-Houston Co., Ltd.—"Means for controlling the supply of current pulses from an alternating current source." 20843. 21st August, 1944. (597310.)

General Motors Corporation.—"Brush holder for dynamo-electric machines." 20953. 2nd September, 1944. (597355.)

Westinghouse Brake & Signal Co., Ltd., and A. H. B. Walker.—"Voltage regulating apparatus for alternating electric current circuits. 21022. 17th August, 1945. (597371.)

General Electric Co., Ltd., and F. S. Hawkins.—"Arc lamps." 21036. 17th August, 1945. (597373.)

W. D. Allan and J. E. M. Johnston.—"Ultra-high-frequency electrical apparatus." 21662. 23rd August, 1945. (597262.)

General Electric Co., Ltd., and A. J. Biggs.—"Electric oscillatory circuits comprising active networks." 23017. 6th September, 1945. (597439.)

1946

Standard Telephones & Cables, Ltd., E. M. S. McWhirter and H J. Ward.—"Electric selective signalling systems." 2886. 8th November, 1944. (Divided out of 597266.) (597325.)

Walsall Conduits, Ltd., and E. Gough.—"Electric tumbler switches." 13606. 13th June, 1945. (Divided out of 597341.) (597385.)

Amended Specifications

589043. English Electric Co., Ltd., and others.—"Prepayment meter mechanism."

590067. D. G. Reid and another.—"Multi-channel high-frequency signalling systems."

Ships' Auxiliaries

A.C. Installations

THE possibility of utilizing 400-V, three-phase systems for marine service was discussed by MR. A. N. SAVAGE (Royal Mail Steam Packet Co.) in a paper which was read last week before the North-East Coast Institution of Engineers and Shipbuilders at Newcastle.

Mr. Savage said that a.c. was a simpler and less expensive substitute for d.c., which was inclined to become over elaborate. This, he felt, was one of the reasons why the installation of a.c. in American and Continental ships was gradually forging ahead.

The system could be either three or four-wire, but for reasons of safety the four-wire system was considered unsuitable. With the three-wire system power circuits should be at generator potential (400 V), heating and cooling circuits at 230 V and lighting at 150 V, the last two voltages being obtained by the use of transformers.

To ensure the maximum advantage from an a.c. installation it was essential, the author stated, that squirrel-cage motors be used wherever possible in preference to wound-rotor or synchronous types. It had been found that squirrel-cage motors with direct-on starting equipment were suitable for the majority of applications on board ship. According to requirements, wound rotor or a.c. commutator machines could be used where it was considered absolutely essential to have a variable speed range.

Mr. Savage concluded by comparing the relative costs of a.c. and d.c. installations.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

Contracts Open

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Ashford.—8th March. U.D.C. 150-MVA main switches. (6th February.)

Belfast.—20th February. Electricity Department. Electrical materials. (30th January.)

Berwick.—Corporation. Electric street lighting fittings for the year ending 31st March, 1949. Borough engineer.

Birkenhead.—3rd March. Electricity Department. 150-MVA switchgear and 500- and 750-kVA transformers. (See this issue.)

Derbyshire.—25th February. County Council Works Department. Cables, lamps and sundry electrical accessories for the year ending 31st March, 1949. (6th February.)

Ebbw Vale.—21st February. Electricity Department. D.c. ampère-hour meters (new or second-hand). (See this issue.)

Edinburgh. — 20th February. Corporation. Refrigerators, sterilizers, laundry and kitchen equipment, etc., at various Public Health properties. City architect, City Chambers.

Glasgow.—24th February. Public Health Department. Four electric vehicles. (30th January.)

Heston & Isleworth.—25th February. Electricity Department. Supply of goods for the year ending 31st March, 1949. (6th February.)

Kettering.—1st March. Electricity Department. Transformers. (6th February.)

Littleborough.—28th February. Electricity Department. E.h.v. switchgear. (See this issue.)

Plympton St. Mary.—6th March. Electricity Department. Supply, delivery and erection of approximately 18 miles of 6,600-V 0·1-sq in. overhead line. (6th February.)

Ramsgate.—23rd February. Borough Council. Electrical equipment for one year from 1st April, 1948. H. G. Curtis, town clerk, Albion House.

Southampton.—17th February. Domestic appliances for the year ending 31st March, 1949. (30th January.)

Orders Placed

Glasgow.—Corporation. Accepted. Rectifier equipments (£23,150).—English Electric Co. Cables for trolley-bus developments and extensions (£20,572).—Scottish Cables.

Heywood.—Electricity Committee. Switchgear and metering equipment at three substations.—Switchgear & Cowans.

Leeds.—Electricity Committee. Recommended. Grit arresting plant at Kirkstall (£35,365).—James Howden & Co. (Land), Ltd.

Middlesbrough.—Corporation. Accepted. Three circuit-breakers (£961).—Yorkshire Switchgear & Engineering Co.

Rochdale.—Electricity Committee. 33-kV cables from Dane Street to Wardleworth substation.—W. T. Glover & Co.

Stockton-on-Tees.—Town Council. Accepted. Equipment for the new substation for Riley Clocks & Instrument Co., Ltd.; h.v. switchgear (£1,531).—A. Reyrolle & Co. L.v. switchgear (£247).—W. Lucy & Co. Transformers (£588).—C. A. Parsons & Co.

Contracts in Prospect

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Aberdeen.—Reconstruction of factory (£40,000); Kilgour & Walker, Berryden Road.

Alnwick (Northumberland). — Houses (34), Shilbottle, for R.D.C.; Reavell & Cahill, Lloyd's Bank Chambers.

Ayrshire.—New machinery and equipment at dairy school at Auchincruive for West of Scotland Agricultural College; J. Kirkwood, head of the dairy school.

Battersea.—Housing scheme, Tyneham Road, for Borough Council; Howes & Jackman, architects, 1, Verulam Buildings, Gray's Inn, W.C.1.

Birmingham.—Nurses' home, West Heath Sanatorium; W. Norman Twist, architect, Sun Buildings, Bennett's Hill, Birmingham, 2.

Blaina.—Centre block at County School; county architect, Queen's Hill, Newport, Mon.

Bolton.—Completion of Technical College; Lanchester & Lloyd, architects, 10, Woburn Square, W.C.1.

Bromsgrove.—Milk depot, Yew Tree Lane; Bromsgrove Dairy Co., Ltd.

Bury.—Primary school, Fairfield (£42,000); J. Chadwick, borough engineer, 28, Bank Street.

Cardiff.—Factory, Penarth Road; Wallis Tin Stamping Co., Ltd., 1, Arlington Street, London, S.W.1.

Chester-le-Street.—Factory, Birtley, for W. T. Henley's Telegraph Works Co., Ltd.; Higgs & Hill, Ltd., builders, Leeds.

Chigwell.—Works; Mitchell Bros. (Steelwork), Ltd., Nursery Lane, Forest Gate, E.7.

Cumberland.—Secondary school, Keswick; county architect, 4, Alfred Street North, Carlisle.

Dronfield.—Brick houses (25), Snape Hill; R. S. Woodhead, clerk to U.D.C., Manor House.

Edmonton.—Rebuilding factory, Bridport Road, for Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham; J. W. Wilson, staff architect.

Grimsby.—Laboratories, industrial estate; Ciba Laboratories, Ltd., Wimblehurst Road, Horsham, Sussex.

Hamilton (Lanarkshire).—Factory for MacLean & Co. (Metal Windows), Glasgow; Scottish Industrial Estates, Ltd.

Hebburn.—Factory for Reays Gearworks, Ltd., Oakwellgate, Gateshead; J. M. Black (Jun.), Ltd., builders, Glen Street, Hebburn.

Hendon.—Flats (48), Milespit Hill; Roger Malcolm, Ltd., builders, 44, Merley Court, Church Lane, N.W.9.

Hexham.—Houses (82), Priestlands estate; U.D.C. surveyor.

King's Lynn.—School, The Friars; C. H. Thurston, county architect, 25, Thorpe Road, Norwich.

Lewisham.—Additional accommodation at Wearside Road Garage (£28,000); M. H. Forward, borough architect, Lewisham Town Hall, Catford, S.E.6.

Lichfield.—Factory, Trent Valley Trading Estate; Bound Brook Bearings (G.B.), Ltd., Birch Road, Birmingham, 6.

London.—Reinstatement of war damage at schools for L.C.C.:—Henry Fawcett School, Kennington (£25,035).—Hugh Minty & Partners, architects, 14, Bedford Row, W.C.1. Thornhill School, Islington (£15,970).—H. S. Goodhart-Rendel & Partners, architects, 13, Crawford Street, W.1.

Lowestoft.—Permanent bungalows (49); borough engineer.

Maidstone.—Two-storey flats (36), four-bedroom houses (18) and shops, Shepway estate; borough surveyor, Town Hall.

Maldon.—Offices, workshops and showrooms, Spiral Road, for Doe & Sons, Ltd.; E. H. Burgess, Ltd., builders, 34, Grosvenor Gardens, S.W.1.

Newcastle-on-Tyne.—Houses (120), for City Council; city architect, 18, Cloth Market.

Newport (Mon).—Extensions to factory of G. F. Lovell & Co., Ltd., Rexville; Ivan Daughtry, architect, 7, Dynevor Road, Bedford.

Norwich.—Houses (82), West Earlham; city architect, City Hall.

Ormesby.—School for E.C.; D. C. Hall, 6, Masons Yard, Duke Street, St. James's, London, S.W.1.

Oxford.—Extensions to Radcliffe Infirmary; Collcutt & Hamp, architects, 7, Queen Street, High Wycombe.

Paignton.—Houses (50); U.D.C. surveyor, Totnes Road.

Portland.—Houses (16), Pound Piece site, for U.D.C.; Crickmay & Son, architects, 23, St. Thomas Street, Weymouth.

Reading.—Works and offices for W. G. Harris (Reading), Ltd., Basingstoke Road; J. S. Paton, architect, 8, Gun Street.

Salop.—County school, Weston Rhyn; county architect, 5, Belmont, Shrewsbury.

Sedgefield.—Houses (36) for farm workers; R.D.C. surveyor.

Sheffield.—Research laboratories; British Iron & Steel Research Association, Steel House, Tothill Street, S.W.1.

Stoke Newington.—Housing scheme, Defoe Road, for Borough Council; Howes & Jackman, architects, 1, Verulam Buildings, Gray's Inn, W.C.1.

Tynemouth.—Junior department at Collingwood School; G. H. Gray, architect, Camden Street, North Shields.

Oil refinery, North Shields, for Trent's Oil Products, Ltd.; H. Moore, Research Laboratories, Godstone Road, Whyteleafe, Surrey.

West Hartlepool.—Additions to Howbeck Hospital (£12,000); borough architect.

Willington Quay.—Extensions to works of Tyne Plywood, Ltd.; W. Stockdale, Howard Street, North Shields, Northumberland.

Wood Green.—Flats, Pellatt Grove, for the T.C.; Vine & Vine, architects, Tudor Chambers, Station Road.

Australian Notes

From a Correspondent

THE Premier of Tasmania (Mr. Brooker) states that at least 90 per cent of homes in the State now have a supply of electricity, and it is expected that when statistics from the Commonwealth census become available Tasmania will lead all the other States in the percentage of homes supplied with power. The output last year averaged 3,114 kWh per head.

On behalf of the State Electricity Commission the Western Australian Government Tender Board has accepted the tender of £204,678 made by the Australian General Electric Pty., Ltd., to erect at the new South Fremantle power station 66-kV outdoor switchgear and 22-kV metalclad indoor switchgear. The same company's tender of £32,283 to erect 3,000-V main power station auxiliary switchgear at the same station has also been accepted.

The electrical trade throughout Australia reports an excellent Christmas turnover, with sales of refrigerators, vacuum cleaners, electric irons and toasters at a very high level. Bookings for future deliveries of electric refrigerators are very heavy.